

ALAGAPPA UNIVERSITY

(Accredited with 'A+' Grade by NAAC)
Karaikudi - 630 003. TAMILNADU



DIRECTORATE OF DISTANCE EDUCATION

M.B.A.
(Project Management)



PAPER - 4.5
PROJECT PREPARATION

ALAGAPPA UNIVERSITY

KARAIKUDI-630 003, TAMILNADU

DIRECTORATE OF DISTANCE EDUCATION

M.B.A. (Project Management)

(IV Semester)



PAPER-4.5

PROJECT PREPARATION

AU/DDE/DE12/Printing Order 34/2017 Date : 1.8.2017 Copies : 300
Printed at Alamelu Printers, Madurai - 1. Cell : 90470 24942

3

Paper 4.5: PROJECT PREPARATION

UNIT 1

Project - Meaning - Features and steps involved in projects – Merits and Demerits of case analysis in projects.

UNIT 2

Issues relating to Project Identification and Formulation: SWOT analysis- Market Survey- Project report preparation – Marketing Project Exports

UNIT 3

Issues relating to Project Appraisal: Market appraisal - Financial Appraisal- Commercial Appraisal – Social appraisal – Feasibility Study.

UNIT 4

Issues relating to Project Implementation- Project Net-working- Project Organization- Project Contracting- Project Personnel

UNIT 5

Issues relating to Project Control- PERT and CPM – Time and Cost Monitoring – Project over-run- Performance Reporting – abandonment analysis.

UNIT 6

Issues relating to nature specific of Projects – Agricultural Projects, Industrial Projects, Infrastructural Projects – Public and Private sector Projects and Disaster Projects.

REFERENCES:

1.Gopalakrishnan P and Ramamoorthy VE – Text Book of Project Management
2. Narendresingh – Project Management and control
3. Rao PCK : Total Project Management
4. Joy PK:

Course Material Prepared by:

Dr. M. Selvam
Professor & Head, International Business & Commerce
Alagappa University, Karaikudi, Tamilnadu – 630 004.

UNIT – 1

PROJECT PREPARATION : INTRODUCTION

Syllabus covered: Project - Meaning -Features and steps involved in projects – Merits and Demerits of case analysis in projects.
OBJECTIVES
1. To explain the meaning, nature and features of a Project. 2. To present the steps in project management and different phases of project life cycle 3. To explain various types of projects 4. 4. To study case study approach to projects

A project is a one-time activity. It may be a long-term project or a short term one. Introducing a new product, process modification, an export market entry, an advertisement campaign launch, entry into a new product, product up gradation, modernization of plant, diversification, installing captive power units, etc are all long term projects. Office system modification, a market survey, recruitment and selection, a training programme etc are short term projects. There are large projects such as construction of a dam, bridge, ship, railway line, track doubling, new product development, air/sea port, air-craft design, space programmes, etc. There are minor projects such as constructing a culvert, desilting of a lake, training programmes, etc.

1. DEFINITION OF PROJECT

Project Management Institute of U.S.A defines a project as, 'a one-shot, time limited, goal directed, major undertaking, requiring the commitment of varied skills and resources. It has also been described a combination of human and non-human resources pooled together in a temporary organization to achieve a specific purpose. The purpose and the set of activities which can achieve that purpose distinguish one project from another'.

Little and others define "a project as any scheme, or part of a scheme, for investing resources which can reasonably be analyzed and evaluated as an

independent unit". The definition is thus arbitrary. Almost any project could be broken down into parts for separate consideration; each of these parts would then by definition a project.

J. Price Gittinger defines a project as, 'A specific activity with a specific starting point and a specific ending point intended to accomplish a specific objective'. A project can be considered as a proposal involving capital investment for the purpose of developing facilities to provide goods and services.

2. FEATURES OF A PROJECT

A project can be identified by its features. The special features of a project that would differentiate from any other on going activity are given below:

i) A project has fixed set of objectives. Once the objectives have been achieved, the project ceases to exist.

ii) It has a specific life span.

iii) Project has a separate entity and normally entrusted to one responsibility centre.

iv) Project calls for a team work.

v) Project has a life cycle reflected by growth, maturity and decline.

vi) A project is Unique. No two projects are exactly similar.

vii) Change is an inherent feature in any project during its life.

viii) Project is based on successive principle and hence it is difficult to learn fully the end results at any stage.

ix) A project works for a specific set of goals with the complex set of diversified activities.

x) High level of sub-contraction of work can be done in a project.

xi) Every project has risk and uncertainty associated with it.

xii) Project needs feasibility and appraisal studies, so that the commitments and results can be known

A project is a one time action. It could involve construction, fabrication, campaigning, production, new launch and so on. It could involve few thousand dollars or billions of dollars. From small advertisement campaign to launching of satellites, from construction of a house to an international air port, erection of plant and machinery to establishment of overseas branch of multinational company, there are thousands and lakhs of projects. Expansion, diversification, modernization, rehabilitation and the like are all projects. Putting up a captive power plant and putting up sheds for company vehicles are also projects. Constructing Dams, Ports, Roads, Hotels, Temples, Theatres, etc are all projects. There are business projects, social projects, infrastructure projects, health projects, public sector projects, private sector projects, overseas projects, domestic projects, inter-continental projects, and so on. World bank , IMF, IDA, ADB, etc mostly make project oriented lending.

3. PROJECT CLASSIFICATION

Projects of sorts are taken up these days. These can be classified in several ways. Size, period, sector, functional activity, strategic aspect, etc are the bases for project classification.

Mega, large, medium, small and tiny projects exist. A capital outlay of less than Rs. 2 lakhs may be taken as tiny projects, upto Rs. 3 crs may be considered small, upto Rs. 30 crs may be considered medium and beyond that may be considered large project. There are mega projects involving outlay, say exceeding Rs. 1000 crs. An auto repair shop is a tiny project, auto sales cum service is small project, a auto dealership for a state or more is a medium project and automobile manufacturing plant is a large project. A multinational size auto plant is a mega-project.

Short, medium and long period projects exist. A project that lasts for a year is short-term project. 1 to 3 year period projects are medium term projects. Beyond 3 year period projects are long-term projects. Desilting of lake, an ad campaign, a leather fair, etc are short term project. Rail track doubling, laying of a double lane road, a 200 metre length bridge construction, a 16000 sq. ft area marriage hall construction, etc are medium term projects. A multipurpose river valley project, a 1000 km railway line building, putting up a 500 MW nuclear power plant, etc are long term projects.

Sectoral Projects are: (i) infrastructural, (ii) core and (iii) non-core projects. Agri, manufacturing and service projects are also sector classified.

Infrastructural projects refer to transport, telecommunication, port, power, etc. Core projects refer to iron and steel projects, petro-chemical projects, etc. Non-core projects are hotel and tourism, automobile, etc. Agri projects include land reclamation, forestry development, etc. Manufacturing projects involve building aircrafts, textile manufacturing, production of computers, etc. Service projects include hospital establishment, PDS project, immunization project, etc.

Function-wise projects may be classified as financial, manufacturing, marketing, personnel, public relations, R&D and so on. Raising capital through launch of GDRs/ADRs, public issue of shares, etc are financial projects. Manufacturing projects include production of say cosmetics, consumer durables, etc. New product launching, new market entry, etc are marketing projects. Completion of executive recruitment, skill up gradation training, etc are personnel projects. Technology building, process modification, etc are some R&D projects.

Turnkey Projects involve completion of the project from "design to run" and handling over the `key' to the owner who has just to turn on and turn off using the `key' provided.

Strategic Projects involve high stakes. The strength, weakness, opportunity and threat of a firm and growth, competitive edge and survival of the firm depend on strategic projects. New product launching, foreign market entry, technology up-gradation, etc are strategic projects. Non-strategic projects are internal oriented, while strategic projects are external oriented.

Project Proposal: Project proposal is a scientifically evolved work plan devised to achieve a specific objective within a specified period of time. A project proposal is a blue print for action oriented activities of an organization. A project proposal presents a plan for action in its totality. The project has a beginning, middle and an end.

4. TYPES OF PROJECTS

Much of what one project will comprise of and consequently what its management will do, depend on the category to which it belongs to. The location, type, technology, size, scope and speed are normally the factors which determine the effort needed in executing a project. Though the characteristics of all projects are the same, they cannot be treated alike. Recognition of the distinction among projects is important for management. Classification of

project helps in highlighting the essential features of the project. Projects are often categorized in terms of many bases.

On the basis of Magnitude of the resources to be invested:

1. Giant projects affecting total economy
2. Big projects affecting at one sector of the economy
3. Medium size projects
4. Small size projects (depending on size, investment & impact)

On the basis of Sector:

1. Industrial project
2. Agricultural project
3. Educational project
4. Health project
5. Social project

On the basis of objective:

1. Social objective project
2. Economic objective project

On the basis of nature of benefits:

1. Quantifiable project
2. Non-quantifiable project

On the basis of dependency:

1. Independent project
2. Dependent project

On the basis of ownership:

1. Public sector project
2. Private sector project
3. Joint sector project

On the basis of social time value of the project:

1. Project with present impact
2. Project with future impact

On the basis of National policy:

1. Project determined by inward looking policy
2. Project determined by outward looking policy

On the basis of risk involved in the project:

1. High risks project
2. Normal risks project
3. Low risks project

On the basis of economic life of the project:

1. Long term project
2. Medium term project
3. Short term project

On the basis of technology involved in the project:

1. High sophisticated technology project
2. Advanced technology project
3. Foreign technology project
4. Indigenous technology project

On the basis of source of resources required by the projects:

1. Project with domestic resources
2. Project with foreign resources

On the Basis of Intensity of Capital or Labour

1. Capital intensive project
2. Labour intensive project

On the basis of sources of finance:

1. Project with domestic financing
2. Project with foreign financing
3. Project with mixed financing
4. Project with financial institutions

On the basis of speed required for execution of the project:

1. Normal project

2. Crash project
3. Disaster project

Normal projects have:

- Adequate time for implementation is available.
- All the phases of the project are allowed to take their normal time.
- No additional requirement of capital is needed.
- No sacrifice in terms of quality is involved.

Crash projects involve:

- Additional cost to speed up execution and gain time.
- Overlapping of phases in execution is generally the case to stick to crash schedule.

Disaster projects have:

- Timely relief to affected people is the sole criterion.
- Anything needed to gain time, is allowed in these projects. Round the clock work is done at the construction site. Capital cost will go up very high. Project time will get drastically reduced.

6. PROJECT STEPS

Every programme, project or product has certain phases of development. The different phases of development of project are called project life cycle. A clear understanding of these phases permits entrepreneurs, managers and executives to have better control over existing and potential resources in the achievement of the desired goals.

Steps in Project Administration

Project administration is a complex process consisting of different steps arranged in a sequential order. Different authors have described these steps in different sequential manner. These steps constitute the life cycle of projects.

According to United Nations Guidelines for Rural Centre Planning, there are 7 steps in the project life cycle. These are: *project identification and appraisal, pre-feasibility study, feasibility study, detailed design project implementation, operation maintenance, monitoring and evaluation.*

Rondinelli, Dennis and Palia in their book "Project Planning and Implementation in Developing countries" identified the following 12 steps in the project life cycle. *Project identification and definition, project formation, preparation and feasibility analysis, project design, project analysis, project selection, project activation and organization, project implementation and operation, project supervision (monitoring and control) project completion or termination, output diffusion and transition to normal administration, project evaluation follow-up and action.*

World Bank: World Bank Guidelines reveal the following six major steps in the project life cycle. *Conception (identification). Formation (preparation). Analysis (appraisal). Implementation (supervision), operation and evaluation.*

All the steps given in different studies can be grouped into three main phases viz.,

- Pre-investment phase
- Implementation phase and
- Operational phase

A brief description of each of these phases is given below:

6.1. PRE-INVESTMENT PHASE

The first phase of the cycle describes the preliminary evaluation of an idea. It consists of identification of investment opportunities, preliminary project analysis, feasibility study and decision-making.

Project idea emanates from the following problems: potential and the needs of the people of an area; plan priorities when planning is done by the government demand and supply projection of various goods and services; Pattern of imports and exports over a period of time; natural resource which can serve as the base for potential manufacturing activity; scope of extending existing lines of activity; consumption pattern in other countries at comparable stages of economic stages of economic development.

On the basis of the investment opportunities, it is possible to conceive a number of projects out of which a particular project may be consistent with development objectives of the area. During this phase, the following aspects of a project must be carefully designed so as to enable proper implementation:

- Project infrastructure and enabling services
- System design and basic engineering package
- Organization and manpower
- Schedules and budgets
- Licensing and governmental clearances
- Finance
- Systems and procedure
- Identification of project manager
- Design basis, general condition for purchase and contracts
- Construction resources and materials
- Work packaging

This phase is involved with preparation for the project to take out smoothly.

Once a project opportunity is conceived, it needs to be examined. Preliminary project analysis concerns with marketing, technical, financial and economic aspects of the project. It seeks to determine whether the project is prima facie worthwhile to justify a feasibility study and what aspects of the projects are critical to its viability and hence call for an in depth investigation.

Feasibility Analysis

A project is analyzed for feasibility on market, technical, financial, economic, environmental and ecological parameters.

Market Feasibility analysis involves the study of (i) aggregate demand for the product/service and (ii) the projects' share in the aggregate demand.

Aggregate demand depends on the nature of the product/service, price-cost factors, export-import policies, demand elasticity and so on.

How the firm is going to cut a market share with its new project or enlarge its share with its existing project getting modified? This is the crucial point. Feasibility has to be studied from the point of view of getting a foot-hold through product superiority, price attraction, distribution manipulations or promotional tricks.

Technical Feasibility is the ability to produce the product/service meeting certain well-laid out technological parameters. Raw material availability,

technology availability (indigenous, imported, transferred; up-scaled or otherwise), minimum size matters, process choice equipment & appliances availability, location and layout factors, energy efficiency of the production method chosen, rate of tech. obsolescence, etc are the factors to be considered. There is tech. feasibility when the product can be produced inexpensively or taking less time or with added technological sophistication and so on. Shorter gestation period is a hallmark of technological feasibility.

Financial Feasibility studies the capital needed, ability to raise capital effectively, the ROI, the BEP, the cash flow pattern and payback period, the level of risk and so on.

There is financial feasibility if and when, ROI is higher than your rivals and covers cost of capital comfortably, or BEP is lower than that of the competitors, or the payback period is shorter or post payback period returns are large enough to meet difficulties due to longer pay-back period and so on.

Economic Feasibility refers to the contribution of the project to NI, GDP, GDS, export, import substitution, income distribution, ancillary industries development, employment generation, BOP, social and political order of the people, local development, global competitiveness etc. Net positive contribution on many of these aspects is expected.

Environmental and Ecological Feasibility Analysis involves evaluation of the project in terms of (i) energy consumption per rupee of value added, (ii) air, water, surface and noise pollution created per unit of value addition, (iii) extent of damage done to forest cover, water table, human habitat and settlements, etc. What will be costs of restoration? After restoration costs are added, will the project remain still cost effective? If yes, it is a project that can be considered.

Internal and External Constraints

On the basis of feasibility prospects, projects are subjected to a secondary screening. Projects that pass out the same are further subjected to internal & external constraints faced by the unit. Finally projects are selected.

i. Internal Constraints

Internal Constraints refer to the limitations the firm is currently facing in taking up a project.

Employees may resent a new project addition as this may lead to some changes in their work, position, benefits, etc. In highly unionized plants introducing new projects is a difficult task.

Capital Availability is another internal constraint, assuming that the firm is not using external capital market in the time being.

Management Personnel, may, sometimes, have vested interests in blocking new projects. Perhaps, occasionally, for cannibalistic effects, management may reject a new project.

Locational disadvantages may make a project unattractive for a particular firm. Space and building constraints may also stand in the way.

Authority-Responsibility structure is an organization might be a constraint in taking up a new project. While senior may not have time to assume additional responsibility, he is not interested in giving the project to his junior for fear of the latter becoming popular along with the project.

ii. External Constraints

External constraints arise due to (i) project dependence, (ii) capital rationing and (iii) project indivisibility.

Dependence of Projects is taken up first.

There are projects which are though not mutually exclusive, i.e., the selection one does not affect the selection or otherwise of the other, when taken together, one is eating into the revenues of the other. A toll bridge and toll ferry service over a perennial river are a case in point. Both can be simultaneously taken up. But, only either one or the other will emerge profitable. So, the choice of project is externally affected.

Capital Rationing, as a constraint affects the firm when it cannot raise resources at the planned cost of capital either due to sudden changes in capital market conditions or due to increased risk perception of the investors about the project.

Project Indivisibility is an important constraint. Small businesses are affected by this factor. There is no partial taking up of the project. Full scale implementation might put strains on the firm's budget, cost of capital etc.

Taking into account both the internal and external constraints project solution is made. After selection detailed design, detailed project report, detailed review programme, etc are worked out.

Feasibility Report

The feasibility report is developed based on feasibility studies made and the constraints. The contents of the feasibility report could be as follows:

i) ***Introduction.*** A brief summary of the contents of the Feasibility Report is to be given.

ii) ***Plan Requirements.*** The need for this plant/project from the point of view of National Plans is to be stated indicating the present importance of the project.

iii) ***Market Prospects.*** Prevailing prices, the location of demand (by region or by cities), the pattern of demand, the increase-in demand over the life-time of the project, the product-mix (by quantities) and the distribution channels are to be specified.

iv) ***Technical Details.*** The size and process to be used, should be mentioned.

v) ***Location of the Project.*** Different locations are to be studied and an outline of economic comparisons to be made.

vi) ***Project Estimate*** (for the project selected). Construction cost, construction schedule (use of PERT recommended), the working capital requirement, the financial structure, the operating profit estimates, the cash flow statement and balance sheets are casts are to be known.

vii) ***Profitability of the Project.*** Showing the average return of original capital investment and the present worth of the project to be provided.

viii) ***Benefit Cost to National Economy.*** Giving the savings in foreign exchange, the earnings in foreign exchange, the fuller utilization of resources, the associated increase in industrial skills in regions/nation, the development of the regions, the reduction of regional unemployment, the development of industry vital to national defense to be indicated, and, if possible, the national economic benefit index be indicated; also in qualitative terms, all the other benefits which cannot be converted into monetary terms are to be described. A project is a one-time activity. It may be a long-term project or a short term one. Introducing a new

product, process modification, an export market entry, an advertisement campaign launch, entry into a new product, product up gradation, modernization of plant, diversification, installing captive power units, etc are all long term projects. Office system modification, a market survey, recruitment and selection, a training programme etc are short term projects. There are large projects such as construction of a dam, bridge, ship, railway line, track doubling, new product development, etc. There are minor projects such as constructing a culvert, desilting of a lake, etc.

More details, through and complete feasibility study results in a reasonably adequate formulation of the projects in terms of location, production capacity production technology and material inputs. The feasibility study contains fairly specific estimates of project cost, means of financing sales revenues, production costs, financial profitability and social profitability.

Based on the thorough feasibility study the project owner or sponsors or financiers can decide whether to accept or reject a particular project. In other words, the decisions whether investment on the project should be made or not has to be made at this stage.

6.2. IMPLEMENTATION PHASE

The implementation phase of an industrial project involves setting up of manufacturing facilities. After judging the worthiness, project needs to be designed for implementation. Drawings, blue prints and the sequences in which the various activities concerning the project need to be carried out. The mail activities under this phase are:

i. Project and engineering design: It consists of site probing and prospecting, preparation of blue prints, plant design, plant engineering, selection of machinery, equipment.

ii. Negotiations and contractions: It covers the activities like project financing, acquisition of technology, construction of building and civil works, provision of utilities supply of machine and equipment, marketing arrangement etc.

iii. Construction: This step involves the activities like site preparation, construction of building, erection and installation of machinery and equipment.

iv. Training engineers, technicians and workers.

v. Plant commissioning.

Network techniques - Programme Evaluation and Review Technique (PERT) and Critical Path Method (CPM) are useful techniques in project management arena. Project is simply a major work - like constructions, installations, designs, commissioning of new products, setting up a business and so on. Several activities are involved in a project. There is some order in which the activities have to be taken up. Certain activities have to precede some activities and succeed the rest. Some activities can be simultaneously taken up. The time required for completion of each activity has to be known. Usually three estimates - optimistic, pessimistic and most likely, are made under PERT, which assumes uncertainty.. From these estimates an expected time for completion is worked out. Based on time for completion and the sequence of taking up of an activity, its earliest start and finish times (EST & EFT) and its latest start and finish times (LST & LFT) are set. Now a graphic/diagrammatic presentation of all activities of the project can be thought of. Such a diagram would indicate the sequence of activities and the LST, EST, EFT and LFT. Even the cost estimate for each of the activities can be shown. From such diagram the time needed to complete the project as such can be known. That diagram is called `net work`. The network analysis defines the jobs to be done, integrates them in a logical time sequence and finally, more important, affords a system of dynamic monitoring and control over the execution and progress of the project. The `how' of these distinct applications is dealt in this lesson.

6.3. OPERATION PHASE

It is the longest phase in terms of time span. It begins when the project is commissioned and ends when the project is wound up. This is a transition phase in which the hardware built with (he active involvement of various agencies is physically handed over for production. This phase is basically clean up phase for project personnel. The main concern of this phase is of smooth and uninterrupted operation of machinery and plant, development of suitable norms of productivity, establishment of a good quality for the product and securing the market acceptance of the product. It aims to realize the projections made in the project regarding sales, production, cost and profits. Project monitoring and project evaluation are two vital activities under this phase.

Project monitoring is a step towards achieving properly identified objectives through a carefully laid down strategy. Each activity in the project implementation should be carefully watched so that, the progress may be measured and any deviation from the expected progress be identified in time.

Project evaluation refers to post-investment analysis. It aims at finding out whether the project has achieved the objectives for which it was taken up and whether it has created the anticipated or intended impact. This helps in developing an insight for future investment and better planning.

Thus the life cycle of a project narrates the methodology of developing, maintaining and controlling an investment proposal at its various phases in the life cycle.

7. LIFE-CYCLE PHASES AND SYSTEMS APPROACH OF A PROJECT

Every project is a unique entity. It has a beginning, a life, and an end. A project has objectives whose accomplishment signals the end. In other words, projects are akin to living organisms blessed with life-cycles. The life cycle starts with concept phase and concludes with a post-accomplishment phase, i.e., every project traverses through seven phases, namely conception, definition, planning, designing, development or construction, application or implementation and post-completion.

As good as human and natural organism, projects too have to choose and adapt through-out their life-cycles adhering to a system. System here refers to the existence of some interrelationship of all activities in a project. The absence of a system makes the project useless. A system can be defined as a phenomenon "having coalesced, mutual and interacting subsystems mat result in an outcome". Therefore, a systems approach may be interpreted as may "logical and disciplined process" of problem solving. The term 'process' indicates an active on-going pattern having 'input-process-output-feedback'.

The phases in systems life-cycle

- Translation phase: All said and done happens at this stage, where the project objective, jargon mid the criteria for selection are established with a clear circumscription acceptable to all participants.

19

- Analysis: All possible avenues to solve the problem are stated and made understood by all.
- Trade off: The criteria for selection and major constraints governing such selection process are referred to the alternatives chosen for converging with the objective
- Synthesis: Ultimately, the fastest solution in reaching the goal of criss-cross-is an outcome of the integration between analysis and trade-off phases.

8. CASE ANALYSIS

Case method of teaching and learning is popularized by the world repute business school, **Harvard Business School,** (HBS) of the USA. Today, many business schools follow this method with great success producing very successful graduates. What is the magic, behind the superiority of this method of pedagogy? Simple. The learners are put to **simulated real life like situations** to fathom up the mired issues, come with the problems faced, analyze the alternatives to solve the problems and then suggest solution as well.

Role of the decision-maker: When students are presented with a case, they place themselves in the *role of the decision-maker* as they read through the situation and identify the problem they are faced with. The next step is to perform the necessary analysis—examining the causes, considering alternative courses of actions—to come to a set of recommendations.

Study groups: To get the most out of cases, students read and reflect on the case and then often meet in small study groups before class to "warm up" and discuss their findings with other classmates. In class—under the questioning and guidance of the professor—students probe underlying issues, compare different alternatives, and finally, suggest courses of action in light of the company's objectives.

Students do 85%: As a case study unfolds in class, students do 85% of the talking, as the professor steers the conversation by making occasional observations and asking questions. This classroom interaction is enriched by the individual students from diverse industries, functions, countries, and experiences.

Students study and prepare many cases: Students study and prepare many cases, which transforms their experience into one of insight seeking, helping them to recognize the unique aspects of different situations, define problems, suggest further avenues of analysis, and devise and implement action plans. Once they finish the Graduates with ample exposure in case method of pedagogy have the confidence they need to go off and tackle the many business challenges they will face in their real life careers.

Features of case study: i. Study of the *whole unit*, as the unit is defined. ii. Study is *intensive, deep and thorough.* iii. All factors, *general or environmental factors* and specific factors having a bearing on the case are extensively covered. iv. *Historical* perspective, evolution over time and space, and *present* scenario are given full account. v. Case must be something *distinct* either as the best, or the worst or the via media. It was reported that a devoted individual recently committed himself to un-weed the River Cauvery for well over 7 months without a single day of break, all alone, despite ridicules from the fellowmen and women, to a stretch of 8 kms. This is a daunting project, even governments are not showing the guts to embark on. The relevance of the individual's project has won the attention of the authorities and everyone. It is a good case, a distinct action worthy of study.

Sources of Data: For case studies, personal or organizational documents, life history or organizational history, speeches and news items, etc are the sources. Interviewing the person or persons gives a lot more data. Continuity of data and depth and breadth of data are very important.

Phases of Case Study: Choice of case for study, preparations to approach the unit of study, collection and recording of data and interpretation of data are the phases of case research. The utilities of case study are as follows:

- helps formulation of valid hypothesis as certain deep insight into the behavior of the case unit is got;
- helps in taking samples and
- helps in framing and reframing the questionnaire or interview schedule.

Merits of Case Study approach

i) As the case approach involves a focused study, there is lot of scope for generating new ideas and orientations.

ii) Case approach may provide the basis for developing sound methodology of project execution.

iii) New areas of research, hitherto unexplored, could be studied adopting case approach.

iv) Case approach provides scope for objective, qualitative analysis.

v) As the analyst studies in depth very useful and reliable findings may be obtained.

vi) If the analyst is unbiased, then case approach will bring to light the crux of the problems with which practical solutions may be developed.

Limitations of Case study approach

a) A significant limitation of case approach is that unless the analyst is experienced, he might ignore very important aspects.

b) Case approach also depends on the information furnished by the respondents. Unless the project information is accurate, the conclusions are bound to be irrelevant.

c) It is often said that case studies are based on the observations of the analyst conducting it. So unless he is well trained in applying observational technique, this approach may fail to bring reliable findings and conclusions.

d) Sometimes, case studies study non-case entities. A case entity must be distinct of its class worthy of studied as such. Non-case entities are the general or ordinary or of less relevance.

8.1.1 Case of BOOT Contracts and tts Types

Case approach can be used for project analysis very well, because every project is a case. In every in-depth study of every project, there is in fact an analysis of case invariably involved.

BOOT is an outgrowth of private sector involvement in the development of major projects. There has been a growth trend in the recent past both in the developing and developed countries, of encouraging private sector to participate

in various projects. The term BOOT was introduced in the early1980s by the Turkish Prime Minister Turgat Ozal to designate a 'build, own, operate and transfer'.

Smith and Mema defines BOOT as; "a project based on the granting of a concession by the principal, usually a government, to a promoter, sometimes known as the concessionaire, who is responsible for the construction, financing, operating and maintaining the facility over the period of concession before finally transferring the facility, at no cost to the principal, as a fully operational facility. During the concession period the promoter owns and operates the facilities and tries to recover the costs of investment, maintenance while operating the facility to result a margin of profit".

The related. acronyms used to describe concession contracts include:

FBOOT: Finance - Build - Own - Operate - Transfer

BOO: Build - Own - Operate

BOL: Build--Operate - Lease

DBOM: Design-Build-Operate-Maintain ......

DBOT: Design-Build-Operate-Transfer

BOD: Build-Operate - Deliver

BOOST: Build - Own - Operate – Subsidize - Transfer

BRT: Build - Rent - Transfer

BTO: Build - Transfer - Operate

BOT: Build - Operate - Transfer

8.1.2 Features of BOOT Model

The salient features of BOOT model can be identified as:

- A joint venture (JV) company would be formed to implement the project Members of the JV would include foreign contractors arid eventual operator of me project each having global recognition. Possibilities may exist for local electricity authorities or other acceptable local entities to opt for an equity stake in the JV.
- The JV then raises finance as required. It .also arranges for construction of the project through commencement to completion.

- During the operating phase, the JV assumes commercial responsibility for managing the project.
- A supply consortium would be formed with the major project suppliers and contractors.
- • The JV then enters into a turnkey power plant supply contract with the supply consortium.
- At the end of the project operation period (say ten years after commencement of operation) it is intended that the host government would purchase the shares from the investors in the JV based on a predetermined formula.

8.1.3 Classification of BOOT Contracts

BOOT projects may be classified on the basis of the method of procurement, type of facility, the location of the facility and the method of revenue generation. They range from:

- Speculative to invited
- infrastructure to industrial/process
- domestic to international
- market-led to contract-led

8.1.4 Projects suitable for BOOT Contracts

Country highways, bridges and tunnels, water, gas or oil pipelines and hydroelectric facilities are considered suitable projects, as a private economic equilibrium is obtainable. However, subsidies are often necessary for high-speed train networks and light all trains, as prices paid by users are often low and governments generally prefer to control prices. The characteristics of BOOT projects are particularly mass transit railways and power generation, and as such they have a political dimension of public welfare mat is not the feature of other privately financed projects.'

The major components of s BOOT project include:

Build: design, procure, manage ,construct and finance the project implementation.

Own: own the asset during concession period and the license for the equipment used.

Operate: manage and operate plant, carry out maintenance, deliver product or service and receive off-take payment.

Transfer: hand over the plant in operating condition at the end of the concession period.

8.1.5 BOOT Packages

BOOT contracts may be determined by four major packages:

Construction Package: Comprises all the components associated with building a facility, normally undertaken in the pre-completion phase and includes: feasibility studies, site investigation, design, construction, supervision, land purchase, commissioning, procurement, insurances and legal contracts.

Operational Package: Comprises all the components associated with operating and where applicable owning the facility and includes: operation, maintenance, training, off-take, transfer, consumables, insurances, guarantees, warranties, licenses, and power contracts.

Financial Package: Comprises all the components associated with debt finance, equity finance, standby loan agreements, shareholder agreements, currency contracts and debt. service arrangements for financing the building.

Revenue Package: Comprises all the components associated with revenue generation and includes: demand analysis, duty and tariff levels, assignment of revenues, tariff structures and revenues from associated developments.

8.1.6. Advantages of BOOT Project

The BOOT project offers both direct and indirect advantages exclusively for developing countries like India as follows:

- Promoting private investment
- Completing projects on time without cost overruns
- Good management and efficient operation
- Transfer of new and advanced technology
- Utilizing foreign companies' resources
- Injecting new foreign capital into the economy
- Providing additional financial source for priority sector projects
- Allowing no inroads on public debt
- Releasing the burden on public budget for infrastructure development

- Creating positive effect on the credibility of the host country
  i) This would offer the possibility of realizing a project that would otherwise not be built by either the host government or its entrepreneurs.
  ii) The willingness of equity investors and lenders to accept the risks would indicate that the project was commercially viable.
  iii) The promoters control and continuing economic interest in design, construction and operation of a project will result in significant cost effectiveness, which will benefit the host country in many respects. This may also reduce the overall cost involved in undertaking any mega-projects for public welfare. Efficiency and effectiveness are inevitable in developing highways, mass transport systems, tele-networks etc., of public utilities which demand huge funds.
  iv) The usefulness to the host government to use a BOOT project as a benchmark to measure the efficiency of a similar public sector project. In general public sector projects exhibit cost and time overruns which can be reduced to a great extent by using the benchmarking effect.
  v) The continued direct involvement of (he project company would promote a continuous transfer of technology, which would ultimately be passed on to the host country. A strong training program would leave a fully trained local staff at the end of the concession period.
  vi) A BOOT project has an obvious appeal to a government seeking to move its domestic economy into the private sector and especially for the Third World countries where public sectors have become white-elephants.

8.1.7 Disadvantages of BOOT Projects

i) Commercial lenders and export credit guarantee agencies will be constrained by the same host country risks whether or not the BOOT approach is adopted.

ii) This benefit may be lost if the host government provides too much support to a BOOT project, resulting in the promoter bearing no real risk.

iii) A BOOT project is a highly complicated cost structure, which requires time, money, patience and sophistication to negotiate and bring it to fruition. The overall cost to a host government is greater than that of traditional public sector projects, although proponents of the BOOT approach argue that overall costs are less when design and operating efficiencies are taken into account and compared with public sector alternatives.

iv) Efficiency landmarks that are generally set under BOOT project are quite high. These benchmarks might create crisis on the part of executives who may not perform upto the required standards under such projects. The project may be a futile boondoggle under such prescribed environment.

v) Change in the form of technology may be strongly resisted by the existing staff members of any government organization. This is because it is perceived that such transfer of technology may bring in new problems that call for updating their knowledge and removing fear of inability to cope with such changes.

vi) Political influences may permeate this smooth process of encouraging privatization and become an obstacle while executing important sectoral projects.

8.2. Case analysis of BOT Projects

BOT, which stands for Built-Operate-Transfer, encapsulates the process whereby a government turns over to the private sector what would normally be a public sector project (example, transportation or infrastructure projects) for building an initial operation and after a limited period (say a 25 years concession) transfer back to the government.

The structure of BOT financing normally takes the form of limited recourse lending to specially incorporated project vehicle which holds the concession from the host government to carry out the construction and operation of the project. A concession agreement will usually form the basis of BOT project financing. It is essentially a license or permission to implement a project, and is rather a hybrid document. Not only must it be satisfactory to the parties to the concession agreement, but it must ultimately meet the requirements of project investors and lenders. Thus it contains commercial terms (for example,

concession period, project infrastructure specification, construction time-table and concession fee, etc.) and financial terms (for example, ability of lenders to create security over the concession agreement and project assets, recourse of lenders to the host government and the effect of premature termination on project indebtedness).

The other variations to the BOT structure are: DBFO (design, build, finance and operate), DCMF (designed-constructed-managed-financed) and BOO (build-own-operate) schemes.

Questions

1. What is a project? How are projects classified? What are the features of a project?
2. What are the steps involved in a project?
3. Explain BOOT and BOT projects and their features.
4. What is the systems approach to the study of projects?
5. What is a case analysis? How is it useful to project management? What are its limitations?
6. Explain the significance, merits and demerits of BOOT and BOT projects.

* * *

UNIT – 2

PROJECT : IDENTIFICATION AND FORMULATION

Syllabus Covered: Issues relating to Project Identification and Formulation: SWOT analysis- Market Survey- Project report preparation – Marketing Project Exports

OBJECTIVES

1. To study the methods and approaches to project identification
2. To present methods of project scouting
3. To present issues relevant to project formulation
4. To discuss use of SWOT analysis in the context of project formulation
5. To present the uses of market survey in the context of project formulation
6. To present the steps in preparing project report
7. To explain the concept of project export and the present scenario of project exports in India.

1. PROJECT IDENTIFICATION

Identifying a project is the first and foremost step in project life cycle management. An entrepreneur has to devote considerable time and attention for this. Shrewdness, forward looking attitude, 360 degree search, etc are needed. A thorough search and sometimes research, are needed to spot a project or projects. And the search has to be extensive, exhaustive and international. The identification of projects or investment opportunities calls for understanding the environment in which one operates, sensitivity to emerging business possibilities, imaginative analysis of a variety of factors and also a bit of luck. An entrepreneur has an infinitely wide choice with respect to his project in different dimensions such as product/service, market, technology, equipment, scale of production, time phasing and location. This chapter is concerned with the scouting and screening of project ideas, steps in the project identification process and also consideration involved in identifying the new projects by an existing company.

1.1 Project Ideas

It is the first and foremost task of an entrepreneur to find out suitable business which is feasible and promising and which merits further examination and appraisal. Therefore, he has to first search for sound workable business ideas and give a practical shape to them. While doing so, the entrepreneur has to tackle the various problems from time to time to achieve the ultimate success. Since the good project ideas are elusive, a variety of sources should be tapped to stimulate the generation of project ideas.

1.2 Sources of Project Ideas

Project ideas could originate from the various sources viz.,

i) Success story of a friend/relative
ii) Experience of others in manufacture/sale of product or rendering service
iii) Examining the inputs, process and outputs of industries and search for improved process, substitute input, and so on
iv) Watch out Government Plan outlays, schemes and guidelines
v) Development programmes of financial institutions and developmental agencies
vi) Investigation of local Resources, material and human and ways of tapping them
vii) Economic and social changes of the economy
viii) B2B advertisements, C2B communications, and so on
ix) Project profiles and industrial potential surveys
x) Visits to trade fairs, industrial exhibitions
xi) Unfulfilled human needs
xii) Possibility of reviving and rehabilitating sick units
xiii) New Inventions and patents and new technological developments business opportunities around them
xiv) Tender notifications of businesses, government departments, universities, etc.
xv) Liberalization, Privatization and Globalization policy drives by governments, as this means new business opportunities for private sector, MNCs, etc.

The various sources from which the project idea can be generated are explained below:

1.2.1 Analyze the performance of existing industries

A study of existing industries in terms of their profitability and capacity utilization is helpful. The analysis of profitability and break even level of various industries could indicate promising investment opportunities. An examination of capacity utilization of various industries provides information about the potential for further investment. Such a study becomes more useful if it is done region-wise, particularly for products which have high transportation costs.

1.2.2 Examine the inputs, process and outputs of industries

An analysis of the inputs required for various industries may throw up project ideas. Opportunities exist when (i) materials and supplies are presently being procured from different sources with attendant time lag and transportation costs and (ii) several firms produce internally some components/parts which can be supplied at a lower cost by a single manufacturer who can enjoy economies of scale.

A study of the output structure of existing industries may reveal opportunities for further processing of output or even processing of waste.

A study of the processes followed may reveal opportunities for improving the process, with time and cost advantages

1.2.3 Examine imports and exports : Volume, Value and Direction

An analysis of import statistics for a period of five to seven years is helpful in understanding the trend of imports of various goods and the potential for import substitution. Indigenous manufacture of goods currently imported is advantageous for several reasons:

i. It improves the balance of payments situation

ii. It provides market for supporting industries and services

iii. It generates employment

Likewise, an examination of export statistics is useful in learning about the export possibilities of various products in various countries..

1.2.4 Plan outlays and government guidelines

The government plays a very important role in many economies. Government's proposed outlays in different sectors provide useful pointers toward investment opportunities. For instance the schemes of distribution of free colour TVs, Gas Stoves, Dhoties and Sarees, Bi-cycles, Books, etc are providing business opportunities for businesses. They indicate the potential demand for goods and service required by different sectors.

1.2.5 Developmental Schemes of financial institutions and developmental agencies:

In a bid to promote development of industries in their respective states, state financial corporations, state industrial development corporations and other developmental bodies conduct studies, prepare feasibility reports and offer suggestions to potential entrepreneurs. The developmental schemes suggested by them give project ideas.

1.2.6 Investigate local resources – material and Human

A search for project ideas may begin with an investigation into local resources and skills, various ways of adding value to the locally available materials. Similarly, the skills of local artisans may suggest products that may be profitably produced and marketed.

1.2.7 Analyze economic and social changes

A study of economic and social changes is helpful in projecting demand for various goods and services, shifts in demand for goods and services and so on. Changing economic conditions provide new business opportunities. A great awareness of the value of time is dawning on the public. Hence the demand for time saving products like packaged food items, ovens and powered vehicles has been increasing. Another change that we are witnessing is that the desire for leisure and recreational. activities has been increasing. This has caused a growth in the market for recreational products, fitness products and services.

1.2.8 Explore the possibility of reviving and rehabilitation of sick units

Industrial sickness does happen in developed and developed countries. These units are either closed or face the prospect of closure. A significant proportion of sick units, however, can be nursed back to health by sound management, infusion of further capital and provision of complementary inputs.

Hence there is a fairly good scope for investment in this area. Such investments typically have a shorter gestation period because one does not have to begin from scratch. Indeed, in many cases, marginal efforts would suffice to revive such units.

1.2.9 Identify unfulfilled human needs

For well established, multi brand product groups like bathing soaps, detergents, cosmetics and tooth pastes, the question to be asked is not whether there is an opportunity to manufacture something to satisfy an actual physical need but whether there are certain psychological needs of consumers which are presently unfulfilled. To find whether such an opportunity exists, the technique of spectrum analysis may be followed. This analysis is done somewhat as follows. (i) Important factors influencing brand choice are identified (ii) Respect of the factors identified in step (iii) Gaps which exist in relation to consumer psychological needs are identified.

1.2.10 Visit to trade fairs

Attending the National and International trade fairs/ exhibitions/ conventions/ conferences provides an excellent opportunity to know about new products/ services and new development.

1.2.11 B2B advertisements, C2B communications, Yellow pages ads, and so on:

B2B advertisements, C2B communications, and so on give out business solicitations, joint venture opportunities and the like. Trade journals and business dailies also provide business solicitations.

1.2.12 Government agencies, Credit institutions, Non-governmental organizations, Village Panchayats and also public:

Project ideas may be generated by the Government agencies, credit institutions, non-governmental organizations and also by public.

The Govt. have largest resources and have the necessary information to generate project ideas and it plays a predominant role in this sphere. The government has the required facilities and manpower to conduct detailed studies which may lead to making investment decisions. Banks and other financial institutions are actively involved in sharing the social responsibility of achieving the national objectives of economic development. The co-operatives and non

governmental organizations as well as individual entrepreneurs are now actively participated in identification of projects. The awareness of involving the people or the beneficiaries in project identification is now increasing fast. Since the local people have the first hand knowledge of the potentials and problems of the area to which they belong, more realistic project identification has become possible with their involvement. It needs no emphasis the project ideas would be generated in better manner both in the qualitative as well as quantitative terms when the knowledge and ideas of the Govt. functionaries, **people, the** financial institutions and other experts are pooled together.

1.3 PURPOSE AND NEED FOR PROJECT IDENTIFICATION

The entire economic management planning is based on two fundamental assumptions, i.e. i. limited means and ii. Unlimited ends. A planner has to select few important needs to cut it into size of his/her means. This may be treated as fixing the priority is called identification of project. It helps in elimination process. Identification and selection, of a project is a scientific process. This process is based on certain essential conditions. It may differ from project to project

Essential conditions: The essential conditions which should be taken into consideration for identification and selection of production projects are as follows:

- Project should be in conformity with the economic needs of the area.
- It should take into account the depriving factors which might have adverse impact
- The input-output ratio should be optimum.
- The purpose of the project is to increase the production and employment of the area.

Thus, the above said conditions will differ due to resources availability, use pattern and other relevant conditions of the area. Besides that, project should also consider certain national priorities.

1.4 STEPS IN PROJECT IDENTIFICATION

Project ideas are like other ideas which don't take concrete shape immediately. There are several stages of making propositions their considerations and scrutiny for their soundness.

An idea is first born, it is under incubation for sometime and subsequently it begins to take some definite shape. The project ideas to **develop** take almost the same course. This project identification may be broadly divided into four stages, viz.,

A. Conceptual stage - where project ideas are generated

B. Screening stage - at which unviable ideas are eliminated

C. Preliminary choice stage - at which viable projects are selected

D. Pre-feasibility stage - at which pre-feasibility studies are taking up.

Conceptual Stage

A number of project ideas are generated either by the officials or non-officials in businesses and governments and by entrepreneurs individually or collectively who are conversant with the area. In this context, one has to examine the potentialities of the projects, development and other associated problems, needs and aspirations of the people of the concerned area.

Screening stage

In the second stage project ideas generated above are screened in a preliminary exercise to weed out the unviable ideas. All project ideas would not pass the screening test. Some project ideas may be imaginary **to** warrant any serious consideration.

Preliminary choice stage

The third stage is the Preliminary choice stage. Here the project idea is confirmed to be worthy of serious consideration.

Pre-feasibility stage

Pre-feasibility stage involves project idea being almost selected for detailed feasibility analysis. Pre-feasibility study is an intermediate stage between an investment opportunity study and a detailed feasibility study and these can be differentiated mainly on the basis of information required for respective stages.

1.5 SCREENING QF PROJECT IDEAS

After gathering the project ideas from the various sources as aforesaid, it is essential to eliminate ideas which prima facie are not promising. This process

of eliminating the irrelevant and unviable ideas is called screening of project ideas. It can be done with the help of testing the following conditions of the propositions.

a. Compatibility with the promoter

b. Consistency with governmental priorities

c. Availability of inputs

d. Adequacy of market

e. Reasonableness of cost

f. Acceptability of risk level etc.

Compatibility with the promoter: The project idea must be compatible with interested personality and resources of the entrepreneur. It should be accessible to him and also it offers him the prospects of rapid growth and high return on invested capital.

Consistency with governmental priorities: The project idea must satisfy or go along with the Governmental priorities, National goals and Governmental regulatory framework as to environment, Export-import commitment, etc.

Availability of inputs: The resources and inputs required for the project must be reasonably assured. This feature of the project can be assessed with the help of the following points relating to a project.

- Capital requirement within manageable limit
- Obtaining technical know-how
- Availability of raw materials at a reasonable cost
- Obtaining power supply

Adequacy of market: Identifying the adequacy of market is the key factor to select, the viable project idea. To judge the adequacy of market the following factors have to be examined.

- Total present domestic market
- Competitors and their market shares
- Export market
- Quality price profile of the product
- Sale and distribution system
- Projected increase in consumption

- Barriers to the entry of new units
- Economic social and demographic trends favourable to increased consumption
- Patent protection

Reasonableness of cost: Reasonableness of cost is another factor to screen the project ideas. The first structure of the proposed project must enable it to realize an acceptable profit with a competitive price. The following cost factors must be carefully considered to design a viable cost structure.

- Cost of material inputs, labour costs, factory overheads.
- General administration expenses, selling and distribution costs.
- Service costs, economics of scale etc.

Acceptability of risk: Acceptability of risk level is another factor which helps to screen the project ideas and hence determine the desirability of a project.

1.6 METHODOLOGY FOR PROJECT IDENTIFICATION

To make a viable project it should be linked with the actual circumstances prevailing in the area. Without knowing the basic information relating to socio-economic conditions of the area, it is difficult to draw a suitable project for the area. Development needs and potentials vary from area to area. For specific area, before drawing a project, local condition and other relevant factors must be taken into consideration. Most of the project fail because they were not based on local problems. Assumptions based on macro level information may fail to watch at micro level. Survey is a technique to unearth the hidden information which are vital to identify the basic requisites of project i.e. need, resources and priorities. It also helps in making right choice between different alternatives. Secondly it presents lot of information to be used as bench mark information which will help at the later stage for evaluation of the project.

1.6.1 Project Identification for an Existing Company

Existing companies essentially large ones are continuously developing various projects for their developmental purposes. While doing so, the existing company has to make a more intensive analysis of its resources and environment and conceive of projects on the basis of its existing activities. An existing company which seeks to identify new project opportunities should undertake a "SWOT" analysis. It is an acronym law of strengths and weaknesses and

opportunities and threats. This analysis evaluate all these four characteristics of existing company.

A brief summary of the points required for SWOT analysis is given below:

i. Availability of internal financial reasons for new projects after taking into account the need for replacement expenditure, increase in working capital, repayment of borrowings and dividend payments.

ii. Capability of raising external financial resources.

iii. Availability of production facilities.

iv. Technological capabilities of the company.

v. Availability of different sources of raw materials and its utilization.

vi. Availability of infrastructural facilities.

vii. Cost structure and profit margins of the company.

viii. Distribution network of the company

ix. Market share of the company.

x. Capability of top management of the company.

xi. State of industrial relations in the company.

xii. Impact of corporate laws on the growth of the company especially (MRTP ACT) etc.,

xiii. Likely changes in the governmental policies.

xiv. Possibility of evolving new technology and its impact on the cost structure of the company.

xv. Existence and severity of competition.

xvi. Changes in the customers preferences, tastes etc.

2. PROJECT FORMULATION

Project formulation is an investigating process which precedes investment decision. The purpose is to present relevant facts before the decision-makers to enable them to decide as to whether to 'go-ahead signal' should be given for the project or not.

Formulation of projects involves scientific procedure. It has to present several information, subjective and objective, in nature in a clear-cut way. Formulation involves explaining the objectives, goals and justification for the acceptance of the project. The major task of a project is to assess the financial, technical and managerial involvement and its justification considering the resource constraint. The project formulation stage involves the identification of investment options by the enterprise,

Project formulation is designed to bring the project sponsoring authority and the agencies from whom it has to get concurrence, support etc., on one wavelength. Project formulation by providing a scientifically developed procedure for developing the content as well as the format of the investment proposition, seeks to streamline the process of appraisal of project at government and the aiding agencies level. So, the project formulation is a process involving the joint effort of a team of experts including the economists, the financial analysts and specialists in various fields a well formulated project provides a medium which cut across scientific, social and positional prejudices and provides a common meeting ground for all those who have a contribution to make in successful implementation of a project.

2.2 Stages in Project Formulation

The different stages in the project formulation process are briefly described as follows:

i. Feasibility analysis

ii. Techno-economic analysis

iii. Project design and network analysis

iv. Input analysis

v. Financial analysis

vi. Social cost-benefit analysis and

vii. Project appraisal.

2.2.1 Feasibility analysis

Feasibility analysis is the first stage in the process of project development. The purpose of the analysis is to examine the desirability of investing pre-investment studies. For this purpose it is essential to examine

project idea in the light of the available internal (inputs, resources & outputs) and external constraints (environment).

When a project idea is taken up for developmental three situations can arise: Project appears feasible and appears infeasible.

- The project appears to be feasible and the project idea is taken up for development. Three situations can arise: The project is feasible or project turn out to be not feasible or the available data may not be adequate for arriving at reasonable decision regarding farther investment. When the project idea is found to be feasible, the decision-makers can proceed to invest further resources in pre-investment studies and design development. In the last mentioned case, investment in pre-investment studies will obviously have to be deferred till such time as adequate data regarding the project feasibility is available. The project sponsoring body will therefore like to invest in collecting additional data and defer the investment decision for the time being.
- In the second situation when the project is found to be not feasible, investment in the project idea is completely ruled out.

2.2.2 Techno-economic analysis

Techno-economic analysis is primarily concerned with the identification of project demand potential and the selection of the optimal technology which can be used to achieve the project objectives. The analysis provides necessary material on which the project design can be based. It also indicates whether the economy is in a position to absorb the output of the project or not.

2.2.3 Project design and network analysis

Project design is the heart of the project entity. It defines the individual activities which go into the corpus of the project and their inter-relationship with each other. It identifies the flow of events which must take place before a project can start yielding the results for which **it** has been set up. The inter-relationship between various constituent activities of a project is most conveniently expressed in the form of a network diagram. Project design and network analysis are concerned primarily with the development of the detailed work plans of the project and its time profile, and the presentation of this plan is the form of a detailed network drawing. Project design and network analysis make available to the project formulation team a clear picture of the work elements of the project

and also their sequential relationship. This presentation is the way for detailed identification and quantification of the project inputs, an essential step in the development of the financial and cost-benefit profile of the project."

2.2.4 Input analysis

The objective is to identify and quantify the project inputs and to assess the feasibility of a sustained supply of these inputs all through the effective life span of the project. Resources are consumed in project constituent activities. The best method of identifying the project inputs is therefore to identify these activities determine the resources which each activity will consume individual requirements. Input analysis uses the network plans for developing the input characteristics of the project.

It thereafter proceeds to evaluate the availability of the inputs both in quantitative as well as qualitative terms. Resources required for a successful implementation of a project include not only the material inputs but also human resources which are necessary both for the setting up of the project as also its successful normalization run. Resource requirements estimates form the basis of costs estimates of the project and are, therefore, essential for developing the financial profile and the cost-benefit profile of the project.

2.2.5. Financial analysis

The objective of financial analysis is to evaluate the project from the financial angle and to identify these characteristics. Financial analysis concerns itself with the estimation of the project costs, estimation of project funds requirements. It also involves and appraisal of the financial characteristics of the project so as to establish the relative merits and demerits of the project as compared to other investment opportunities. Financial analysis reduces investment proposition in diverse fields of human activity to one common scale, thereby simplifying the project is developing project financial forecasts.

2.2.6 Cost benefit analysis

In judging the overall worth of the project, the effect which the project will have on society as a whole is very material. While financial analysis evaluates a project from the profitability point of view, social cost benefit analysis views it from the point of view of rational viability, the cost-benefit analysis however takes into account not only the direct costs and benefits which will accrue to the project implementing body but also total costs which all

entities connected with the project will have to bear and the benefits which will be enjoyed by all such entities. The idea here is to evaluate the project in terms of absolute costs and benefits rather than in terms apparent costs and benefits.

2.2.7 Pre-investment appraisal

Pre-investment appraisal is the process of consolidating the results of feasibility analysis, the techno-economic analysis, the design and network analysis, the input analysis, the financial analysis and the cost benefit analysis, so as to give the investment proposition a final and formal shape. It naturally involves selection of appraisal format, the material which should go into pre-investment report and the form of presentation of various conclusions. The sum total of the pre-investment appraisal is to present the ***project*** idea in a form in which the project sponsoring body, the project implementing body and the outside agencies can take investment decision regarding the proposals.

2.3 Criteria to be followed in Project Formulation

The main criteria in the project formulation process are:

i) Forecasting - understanding and precisely identifying the objectives/ needs/goals (regional/state/national/international) of the unit/society/ economy on a sustained basis.

ii) Setting up priorities and choosing the goals that are more urgent

iii) Searching for alternations and carrying out feasibility studies to pick up projects that appear most beneficial and desirable,

iv) Carrying out detailed studies of the project so selected.

v) Estimating the needed resources (human and physical) and finding the yearly cost and benefit of project.

vi) Arranging funds -both approval and allocation. The successful implementation of any project depends upon the timely availability of tile required resources as per projections.

vii) Preparing of time schedule for all jobs so that the physical and financial targets of the projects are phased appropriately.

viii) Distributing the works to various departments or agencies having the appropriate technical expertise.

A2

ix) Execution and controlling the project. This requires frequent reviewing, updating and constant action to restore the operation to its planned characteristics,

x) Evaluating the performance of each project to ensure the worth of good or service for each rupee to be spent.

2.4 Conclusion

Thus the process of project formulation involves a stage by stage development of the project idea into an investment proposition. The conclusion drawn at the end of each stage form the basis of development of the ensuing stage.. These conclusions also provide necessary materials for re-checking of the initial premises from which a beginning was made. There must be forward and backward look at the completion of every stage. So, the project formulation team has to be ready to revise its opinions and conclusions in the light of farther evidence.

3. SWOT ANALYSIS

The acronym SWOT stands for strengths, weaknesses, opportunities and threats. Any entity has its own strengths and weaknesses and it is surrounded by an environment which provide opportunities and wield threats. An organization must take stock of its strengths and weaknesses and also of the opportunities and threats offered/posed by the environment and analyze how best it can negotiate with the environment gives its strengths and weaknesses and the latter's opportunities and threats. Such analysis is called SWOT analysis.

Strengths: The strengths of the projects and the sponsors must be threadbare known. The strengths of individual projects/sponsors differ. But generally the strengths may include: i) Research and Development infrastructure, ii) Enough resources to spend on market promotion, iii) Brand equity built through years of brand building, iv) Management team culture that is adaptive to changing needs of the environs, v) Clout over political bosses in most countries, vi) ability to tide over troughs and droughts in profits, vii) Significant market stakes, viii) Presence in different markets across the globe, ix) Strong Project leadership and x) Ability to taken on competition head-on by innate skills.

Weaknesses: The weaknesses of the projects and the sponsors may include: i) Inability to reach deep into downstream markets, ii) Inability to play `local' cards and sentiments when the project is seen in an alien prism, mostly suffered

by MNC projects, Infra-structure projects iii) High labour and administration cost iv) High degree of risk and uncertainty in availability of various inputs v) Dangers of environmental infidelity of the projects.

Opportunities: The opportunities for projects include i) expanding global trade, ii) enhanced global investment, iii) liberalization drive by many governments, iv) privatization drive by many governments, v) globalization drive by many governments, vi) welcome patronage by consumers worldwide, vii) emerging unified business, finance, investment and labour laws, viii) protection under TRIPS, TRIMS etc under WTO and other multilateral bodies, ix) widespread reception for global capital flows and x) widespread opportunities for mergers, acquisitions, strategic alliances and joint ventures.

Threats: The threats include: i) agitations by Non-government organizations against the designs of big companies ii) agitations by communist and labours across the globe, iii) `Local'' sentiments expressed by influential personalities in each region, iv) consumers outcry against explcitations by big companies, v) terrorism specifically targeting assets of big businesses vi) discriminative business laws in certain countries, vii) not-so-feel good feeling that generally prevails in third world countries about business leaders and viii) competition among businesses and hostile takeovers.

Sponsors of projects must make a thorough SWOT analysis of their projects. This will help aligning the projects well with the social, political, competitive and other environment segments very effectively. The strengths must be multiplied and opportunities added on and aggregated. The weaknesses must be subtracted and threats must be divided. This simple mathematics of SWOT will immensely help project administrators to have strategic advantages.

By considering the above said information keenly, the SWOT analysis helps to provide the basis for the project administration strategy to be followed and indicate the major areas of thrust.

4. MARKET SURVEY

Market survey must cover three important markets. Input market, output market and financial or capital market. The conditions prevailing over there must be probed and evaluated.

4. 1. Input Market Survey

Raw materials: What are the sources of raw materials? Are they locally available? Whether imported raw material is also required? If so, whether license has been obtained? Is it suitable to get quality raw materials continuously at reasonable prices? The availability, quality critically and quality compatibility of the raw material with the technology as well as the plant and machinery are important factors to be clearly understood while evaluating a project especially those in hi-tech area. This element is also intimately linked to many other elements in a project and can force necessary changes in them to ensure the viability of the project.

Labour: What is the type of labour required? Whether skilled or unskilled? Are they competitive and efficient? Are they culturally fit? Are they available in that area? If not, what arrangements have been made to recruit and train the labour in various skills?

Power: Is adequate supply at cheaper rate available? The high cost and undependable supply of electricity is a major problem now-a-days. Will captive power supply be beneficial?

Fuel and Water: Whether the fuel systems like coal, coke, oil or gas and water are required and if yes, what is the state of the availability?

Communication facilities: Availability of communication facilities like telephone, internet, e-mail, telex and post and telegraph department, should be analyzed.

Machinery and Equipments: What about the availability of items of machinery and other equipments in the required type, size and cost? Should they sourced from outside? Will credit be available from the suppliers? Whether leasing a good alternative?

4.2 Market for Outputs

What is the anticipated demand for product? What is out target market? What are its features? What are its growth possibilities? What is the Seasonal break-up sales expected? What is the Regional break-up expected sales? What is the Product break up of expected sales? These must be thoroughly studied. Who are our immediate three threatening or close competitors? What is their market share? Can we better our competitive standing in the next 3 years? How much

market share we can grab? Is there export market potentials? How the same can be tapped? What entry strategies are to be thought of?

Market analysis is very important component. The survey must cover market by market, product by product, region by region, season by season and so on.

4.3 Financial Market Survey

Next the survey of financial market conditions is a must. What about the credit and monetary conditions prevailing? What about liquidity conditions in the money market? What about the cost of capital? Whether debt-equity ratio of 2:1 or other favourable one could be chosen? Is the stock Market buoyant? Are promoter burdened with large stakes and lock in periods of longer periods? Is venture fund available?

A clear under-standing of the various elements and the various institutions operating in the financial system would help to assess the appropriateness of the means of finance from the point of view of cost of raising and servicing funds, and other terms and conditions accompanying funds as all these have a direct impact on the viability of the project. At this juncture, it is worthwhile noting that the project evaluation should also pay due attention to the ethics of fund raising especially if the means of finance involves premium carrying instruments.

5. PROJECT REPORT PREPARATION

A project report is meant to provide the necessary information which may be required for the purpose of processing and assessing the proposal for getting the financial assistance from the financial institutions. This is essentially prepared in order to provide a complete information with proximate-values of the project and presented to the financial institution for appraisal. A project report prepared with utmost care would not only give a clear idea to the banker but also it relives the entrepreneur from the normal objections and formal queries of the banker.

In a developing economy like India, where the development banking is vigorous, an entrepreneur gets a lot of published materials with data relating to various feasibilities and promotional institutions engaged in entrepreneurship development produce good literature covering various aspects of producing a project or products in the country. The Director General of Technical

A6

Development (DGTD), National Small Industries Corporations (NSIC) are some of the pioneer institutions providing variety of information for small scale entrepreneurs to manufacture. They give guidelines for industries indicating those items, in which good scope exists for manufacturing.

With these available information, an entrepreneur has to do the following for starting an industrial unit:

- To decide the type and level of industrial production
- To compare the requirements of funds with his personal availability of finance.
- To prepare a nice project report containing all relevant information

Many of the institutions like SISI, State Financial Institutions also help in preparation of project report and later on recommend them to the banks. Besides these institutions, several commercial banks help the entrepreneurs to get a good project report.

5.1 Components of Project Report

The following are the important headings under which the complete information on relevant aspects should be included for a small scale industry's project report.

i. General information
ii. Rationale
iii. Project description
iv. Market potential
v. Capital expenditure and sources of finance
vi. Assessment of working capital requirements
vii. Other financial factors'
viii. Government and-other statutory approvals
ix. Economic and social variables

5.1.1. General information

The following aspects should be given in the stage, which are of general nature:

- Name and address of the entrepreneur

- The qualifications, experience and other capabilities of the entrepreneur. If it is a partnership firm, these information of other members should also be given.
- A small reference of analysis of industry to which the project belongs e.g. past performance, present status, the way of organization, the problems etc.
- The organizational structure of the enterprise
- The utility of the product and the range of products to be manufactured

5.1.2. Rationale

As mentioned earlier a project may have several objectives subsidiary to the prime objective of making profit. As a first step in project evaluation, it is essential that one looks at the broad rationale of the project proposal to ensure that the project is appropriate and justified. As an example, one could say that modernization or pollution control may be fully justified on grounds of survival and environmental protection even if, in the short-term, the project expenditure may adversely affect the financial criteria of project evaluation. On the other hand, a project which would improve the earnings per share or the debt service cover or the production efficiency may not necessarily be justified if all this is to be achieved at the expense of national interest or public interest.

5.1.3. Project description

A brief description of the project covering the following aspects should be given in the project report.

SITE: Location (Town, Complete address) whether owned or leasehold land, whether the site is approved industrial area? Is it suitable for the product/under review.

Input factors

Raw materials: What are the sources of raw materials? Are they locally available? Whether imported raw material is also required? If so, whether license has been obtained? Is it suitable to get quality raw materials continuously at reasonable prices?

The availability, quality, criticality and compatibility of the raw material with the technology as well as the plant and machinery are important factors to

be clearly understood while evaluating a project especially those in hi-tech area. This element is also intimately linked to many other elements in a project and can force necessary changes in them to ensure the viability of the project.

As a simple example, one can easily surmise that a raw material with a high volume to weight ratio will indicate the plant is located near the source of raw material, e.g. Cement, power (coal based). On the other hand, if the value added m such a case is very high, then it may be possible or even necessary to locate the plant away from the source of raw materials. Textiles, power (gas based of oil based), processed foods like snack foods, ice creams are some the pertinent examples.

The characteristics of the raw materials are multivariate and not just on the volume weight ratio. It is imperative therefore that this element gets a careful consideration while assessing a project. The market, the management, and the utility needs of the projects also influence the locational decisions.

Labour: What is the type of labour required? Whether skilled or unskilled? Are they available in that area? If not, what arrangement have been made to recruit and train the labour in various skills?

Power : Inadequate supply and high cost of electricity is a major problem now-a-days. So, the project report should contain the information regarding the power requirements, the load sanctioned, stability of supply of power and the price at different consumption level.

Fuel and water : Whether the fuel systems like coal, coke, oil or gas are required and if yes, then state their availability position. Similarly water is an important factor. The source and the quality of water should be clearly stated.

Waste discharge: Most of the plants produce waste material or emissions that may result in many health problems to the public. The emissions and discharge may be various types like (a) gaseous (smoke, fumes, dust etc.) by physical (noise, hear, vibration etc.) or (c) liquid or solid discharged through pumps and sewers. Hence, it should be clearly stated that the arrangements made from these things.

Communication and transport facilities: Availability of communication facilities like telephone, telex and post and telegraph department, should be stated in the report. Similarly, transport is a basic necessity for industries. Raw materials as well as finished products have to reach destination through a good

transport systems available. So, the various transport facilities available should be clearly stated. Similarly availability of facilities like machine shops, welding shops, and electrical repair shops etc., should also be stated.

List of machinery and equipments: A complete list of items of machinery and other equipments indicating their type, size and cost should be stated. Source of supply of capital equipment and the construction services should also be given.

The source of plant and machinery as also me specification for the same can often make or break a project. It is, therefore, equally important to evaluate the plant and machinery which is to be installed at the project. The reputation of the supplier and references to place where such/similar plant and machinery are installed is a good starting point while assessing this element

Capacity and technology: The installed and licensed should be stated and the number of shifts likely to follow should be stated. Similarly, is the technology up to date and appropriate? Which other units are using the same technology and with what results? How the required know-how is proposed to be arranged?

The level of technology in terms of its "state of art" or obsolescence, adaptability to the local conditions, maintenance and repairability, sophistication in management and control are elements which have a significant impact on we quality and quantity of production that is envisaged in tile project It is thus necessary to have a clear understanding about the technology which is to be utilized in me project.

It is pertinent to note that (here are no hard and fast rules but "appropriateness" and "relevance" are the two key operative words while assessing a technology proposed for the project. It is ridiculous to propose a highly sophisticated, push button control technology in a place where electricity supply follows its own rules or where a simpler technology is better understood and more manageable. Equally, .it would be disastrous to recommend an obsolete technology on account of its durability or time tested proof of performance when everyone else is fast discarding it

This technology elements is linked to every other element in the project proposal and these linkages also need to be looked into as an essential step in assessing the technology. One of the technologies available may necessitate creation of large capacity not necessarily advisable given the current raw material supply or the market size for the product.

Quality control: What is the system arranged for to check the quality of products on continuous basis? The quality marks like ISI, Agmark will enhance the values of thė product as well as confidence among the consumers. If it is desired to get quality markings, the fact should be included in the project report.

5.1.4. Market Potential

Estimation of demand and supply

Facts regarding the anticipated demand for product and the level of supply, should be clearly stated. An estimate of manufacturing and administrative expenses together with the price expected along with the margin of profit should be stated.

Marketing strategy: What is the strategy adopted for marketing the product should be stated. Whether the products are to be supplied to the reputed sellers directly or distributors? Is there any possibility of getting a contract from the reputed concerns should also be stated in this project report. Similarly whether after sales service has been arranged and how to fill the gap of demand if there is fluctuations in the sales seasonal demand arrangements made for warehousing the products.

5.1.5. Capital Expenditure and Sources of Finance

Cost of the project: Since each project is profit motivate it is important that cost of the project is carefully assessed and evaluated. One of the most important factors in this assessment is the level of accuracy in the cost estimates, which in addition to proper data collection also depends upon the approach and the attitude of the evaluator himself. Some evaluators tend to see all cost estimates as "too high" leading to unnecessary under estimation of the project cost and consequent problems in project implementation and even project viability. On the other hand some evaluators tend to provide "cushions" at all levels of cost estimates which may erode the viability of the project on proper leading to a wrong decision on the issue, of project selection and implementation.

An estimate regarding this various capital inputs required by the industry should be given. Those capital items include the following:

i. Land and building

ii. Plant and machinery

iii. Preliminary expenses

iv. Miscellaneous assets

v. Price escalation

iv. Working capital limit

A clear under-standing of the various elements and the various institutions operating in the financial system would help to assess the appropriateness of the means of finance from the point of view of cost of raising and servicing funds, and other terms and conditions accompanying funds as all these have a direct impact on the viability of the project. At this juncture, it is worthwhile nothing that the project evaluation should also pay due attention to the ethics of fund raising especially if the means of finance involves premium carrying instruments.

5.1.6. Assessment of Working Capital Requirements

Many industries fail due to improper estimate of working capital requirements. It is very crucial to an entrepreneur. The unit could function only if the working capital limit is maintained properly. So, the working capital requirements should be very carefully calculated and stated in the project report.

5.1.7. Other Financial Aspects

It should be found out that the product taken up for production is profitable. For this, profit & Loss A/c an estimated one should be prepared, which shows sales revenue, cost of production and other costs and profit. Similarly a projected balance sheet and cash flow statement should be prepared to indicate financial position and financial requirements. The return from a project is a very essence of evaluating a project especially as the prime motive for setting up a project is its profitability. The project return is lo be assessed in terms of cost of production realizable selling price, financial charges, depreciation taxes *and host of other* financial *and non-financial variables*.

Project Report Vs. Feasibility Report

The detailed project report differs from feasibility report in respect of objectives, scope of information management, time space, use and depth of analysis. These aspects are explained a little below.

Objective: The objective of the 'feasibility report' is to serve the top management in arriving at feasible and viable project alternatives. Detailed Project Report's focus is to communicate formally about the project sponsor's

52

decision on a specific project to the government departments and financial institutions for seeking their approvals and funding.

Scope of information Management: Feasibility report details the different feasibility aspects, namely, technical, economic, commercial and environmental areas only, while project report is having wide scope covering execution, organization, control, etc and other information as well. Feasibility report is made a part of project report, although in a summary form.

Time Space: The feasibility study precedes project report preparation. Feasibility study is a kind of an exploratory type of research and hence consumes a span of 6 to 15 months, depending on individual projects nature and scope. A project report that follows feasibility report takes less time and a good part of it is desk work.

Use: Feasibility study in the short-run immediately after it is carried out, helps in project formulation, but in the long run it serves only as a data bank as the information goes stale. But the project report is a blue print for execution as well. The project report helps in guiding the execution of the project as such. Thus the project report acts as a major signpost for all practical purposes in the project development and for future reference.

Depth of analysis: The depth and magnitude of the feasibility report and project report vary. The information furnished in the feasibility report details in depth on specific aspects of feasibility, yet some secondary issues are, perfunctorily managed. The depth and magnitude of the project report is elaborate covering perfectly some intricate details of the project as well. The report is prepared with diligence taking all precautions to avoid ambiguity and mystery concerning issues of the project.

Thus, Project report is a precise formal document of information prepared and presented by sponsors of a project. On the basis of this report, the funding and permitting authorities decide the fate of the project. It is a means to get approval, finance, clearance and so on. The preparation of detailed project report is the preliminary phase of a project life cycle. The preparation of project report starts only after the investment decision is made on the basis of the technical, economic and financial feasibility studies, so that expensive efforts involved in the preparation of report are not wasted. To prepare the project report from a techno-economic feasibility study, we have to

- break-down all project components, time phase and schedule them minutely and prepare accurate cost estimates, furnishing with necessary and relevant assumptions and calculations.
- develop baselines for controlling time and costs that help the implementation of the project.
- resources to implement the project.

6. MARKETING PROJECT EXPORTS

There has been a substantial transformation of India's project exports structure in the recent years. India has now emerged as a major exporter of capital equipment and other sophisticated items including projects and consultancy services. In fact, the future of India's export trade depends on how far performance in these sectors can be further improved. Project exports mean exporting of schemes/proposals which help to produce goods or generate services.

Exports of projects and services from India broadly fall into three categories, namely:

- Civil engineering construction projects
- Turnkey projects (Engineering, procurement and construction from concept to commissioning including civil work, civil construction and all supplies specific to these turnkey projects)
- Consultancy services (Process and engineering consultancy services relating to above)

6.1. Project Exports Promotion Council of India (PEPC)

Project Exports Promotion Council of India is an export promotion council which was set up by the Government of India in 1984 (as Overseas Construction Council of India). PEPC in line with the Foreign Trade Policy of the Government (of India) not only undertakes the necessary export promotion initiatives but also provides necessary technical information, guidance and support to Indian construction and process engineering contractors and consultants – in public or private sector – to set up overseas projects in any of the following modules of engineering service:

These projects have to be executed in conformity with the guidelines as laid down by the Reserve Bank of India as detailed in their manual designated as Memorandum , Project Export Memorandum (PEM). Besides, PEPC also provides the necessary technical and market information, guidance and export promotion facilitation to the traders/manufacturers of various Project Construction Items (excluding steel and cement) like the following:

6.2. Project Exports: Definition

Project exports can be defined as:

i. turnkey projects, namely those which involve the rendering of services like design, civil construction, erection and commissioning of plant or supervision thereof, along with the supply of equipments.

ii. engineering services contracts, involving the supply of services alone, such as design, erection, commissioning or supervision of erection and commissioning.

iii. Consultancy services contracts, which may include the preparation **of** feasibility studies, project reports, preparation of designs and advise to the projects authority on specifications for plant and equipment preparation of tender documents, evaluation of tenders and purchase of plant and equipment.

iv. Civil construction contracts, with or without preparation of designs and drawings for the civil work to be undertaken.

6.3. Characteristics of Project Exports

In the present context of liberalization and globalization, new strategic initiatives have been taken to promote project exports, since they carry the following essential advantages:

- Project exports employ minimum domestic resources
- Support funding provided by the banking system is of self-liquidating nature over a period of time.
- Project exports provide employment opportunities to trained/skilled manpower as well as help in the absorption of state-of-the-art construction technologies available in the world.

- Project exports tend to create opportunities for generating demand for other Indian construction and engineering products and thus giving a fillip to other ancillary industries also.

Project exports are regarded as a key-indicator of the technical maturity and industrial capabilities of a country and have occupied an important place in India's export portfolio. Project exports not only earn foreign exchange for the country, but also provide an opportunity to our industry in providing additional avenues of growth and employment. They indicate growing technological sophistication of Indian exports giving visibility to the Indian technical expertise and project execution capability in overseas markets and thus boost the economy in manifold ways including generating project revenues, creation of secured markets for goods and services, import of new technology and training of personnel, employment creation during construction and operation phases and earning of foreign exchange.

6.4. India's Vast Experience and Expertise

Owing to the vast experience and expertise gained by the Indian project exporters now, they are in a better position to execute projects of any magnitude and in any of the following sectors/sub sectors of development:

6.4.1. Sectors

A. Agriculture & Natural Resources:

- Fisheries
- Industrial Crops and Agro Industries
- Irrigation and Rural Development

B. Energy

- Electric
- Natural Gas & Oil
- Thermal
- Others

C. Social Infrastructure

- Education
- Health and Population
- Urban Development and Housing
- Water Supply and Sanitation

56

D. Transport and Communication

- Roads and Roads Transport
- Ports and Shipping
- Railways
- Environment Industry Multi-sector Consultancy

E. Turnkey/Engineering Projects

- Food and Agro Processing
- Energy
- Industry - Chemicals/Petrochemicals-fuels
- Fertilizers, Drugs/pharmaceuticals etc.
- Textiles
- Transport and Telecommunications
- Miscellaneous Consultancy

In civil engineering, construction is the building or assembly of any structure, infrastructure, plant or utility. Although this may be thought of as a single activity, in fact construction is a feat of multitasking. Normally the job is managed by the project manager, supervised on site by the design engineer and foreman, scrutinized closely by the stakeholders, and often, when construction delays occur, detested by the public

The successful execution of a project often is more the result of effective planning than anything else. Those involved with the design and execution of the project in question must consider the environmental impact of the job, the successful scheduling, budgeting, site safety, inconvenience to the public caused by construction delays, preparing tender documents, etc.

6.4.2 Consultancy

Services play a crucial role in the economy of any country. Consultancy profession assumes a vital significance amongst the services sector as a catalyst of change in the ever expanding industrial scenario. In order to optimizing and maximizing the use of resources to enhance efficiency and overall returns from a project, the role and help rendered by the consultants are enormous. A very large number of consultants do exist in India. The wide spectrum of disciplines and services provided by Indian consultants range from project identification to

commissioning involving, supervision and training of personnel, market surveys, rehabilitation of sick units as well as operation and maintenance. The consultancy organizations in India are directly or indirectly supported by more than 1,000 R&D institutions and research laboratories both under CSIR as well as other major scientific organizations such as DRDO, Atomic energy and space. Consultancy organizations also work in close unison with IITs, Universities and Financial institutions. In India, the largest concentration of consultancy organizations is in its four metropolitan cities, namely Delhi, Mumbai, Chennai and Kolkata. Analysis of consultancy organizations in terms of technical professionals employed indicates that 68.3% of them have up to 10 technical professionals, 14.3% have 11-25 and 1.5% have more than 1000 technical professionals. Indian consultancy capabilities are strong in several areas such as civil engineering and construction, telecommunication, power, metallurgy, chemical, petrochemicals and computer software.

The service provided include feasibility and market studies, erection and commissioning of plant and machinery, system engineering etc.

Following specialties reflect the strength of Indian Consultancy profession :

- Well dispersed and wide ranging areas of specialization to service diverse range of clientele needs.
- Advanced technical talents/ skills at reasonable cost.
- Familiarity with local conditions

The development of consultancy profession in India has been quite significant during the past one decade and a large number of consultants are now available in the country in various disciplines like Agriculture and Rural Development Sector, Construction Industry Development Sector, Tourism Sector, Transportation Sector, Urban Development Sector, and Water Supply and Sanitation Sector. These consultants offer a multiplicity of consultancy services, many of them meeting world standards. With the liberalization of economy, demands for consultants is increasing rapidly. The users of consultancy find it difficult to locate suitable consultants to meet their requirements.

For any country to derive maximum benefits from the consultancy services, it is essential that, in addition to being of high professional standards,

these services are of the highest universally accepted moral and ethical standards.

Indian companies entered overseas project markets in early 1970's. There was a boom in project opportunities, especially in West Asia, with Iraq and Libya standing atop. The boom however receded sharply in 1982 due to Iran-Iraq war. Iraq still remained a major market for our civil construction works till the Gulf war in 1990. The business opportunities for Indian project exporters declined as United Nations Security Council posed sanctions against Iraq, and is still in force. Project exports from India registered great growth reaching a level of $ 7.1 bn now in over 40 countries on about 200 projects.

6.5. Promotional Measures and Incentives

Government has taken a number of promotional measures with a view to encourage export of projects which includes

i. Market development assistance in this 50% of cost of preparation and submission of bids is reimbursed.

ii. Market development assistance for opening and operating offices overseas by consulting firms.

iii. Setting up of a "Consultancy Trust Fund" of US$ 0.5 nm with the world bank to be utilized for engaging Indian consultants for world bank financed projects.

iv. EXIM bank in addition to supplier's credit and buyer's credit has also been extending lines of credit to various developing countries with a view to encourage project exports.

v. Exemption of IT up to 50% on earnings from exports of projects and consultancy services under section 80HHB and 80-0 of IT Act respectively.

vi. Import of used machinery and equipments by the project exporters has been allowed on concessional customs duty basis at 25% ad valorem.

vii. EXIM bank has recently introduced a 'Strategic Market Entry Support Scheme' to reimburse the cost of tendering in respect of successful bids submitted to multilaterally funded overseas projects.

6.6 Problems of Project Exports

i. One of the main problem faced by many Indian firms willing to participate in international tenders is the delay in securing tender documents.

ii. Another difficulty relates to the fact that in die case of contracts involving huge amount and high technology, awards are generally made on the basis of established image and reputation. Not many Indian firms have so far reached that stage where they would be able to compete successfully with large multinational corporations.

iii. The third problem which is reportedly faced by many Indian firms is their inability to offer as liberal credit terms as offered by the foreign competitors.

iv. Finally, but not me least importantly, is the problem faced by related to agency commission.

6.7 Marketing of Project Exports

i) Price is not necessarily the primary factor in sales. Product characteristics, reputation of the seller, the location of the production and credit terms are other important factors.

ii) In many of the developing countries bidders have find that the buyers frequently do not develop detailed plans and specifications on their own. Some bidders have put together planning studies to aid departments hoping that they would be able to introduce hoping that they would be able to introduce specifications to their own advantage or will obtain preferential treatment in the contract award if the plan is accepted.

iii) In spite of the talks on unbundling of the technology package, the trend is towards more comprehensive deals including training, maintenance and infrastructure development. This has resulted in bids being submitted by a consortia of companies even from different countries.

iv) In the high technology sector, the product characteristics are the primary basis of competitive advantage,

v) Governments are also reluctant to buy a product from a foreign firm which has not been successful to sell to its own government.

vi) Although sales of high technology items depend heavily on personal selling, during the bidding process, many firms undertake image advertising.

vii) One selling method is reference selling which involves bringing respective govt. purchases into contact with satisfied customers.

viii) Agents are utilized intensively for the sale of this type of products apart from serving as conduits for payments to govt. officials.

ix) A popular way of promotion is through trade shows and fairs.

x) Financial arrangements are extremely important for sales to developing and centrally planned economies.

Questions:

1. What do you mean by project formulation? Explain the several aspects of project formulation.
2. What are the different phases of project formulation?
3. Explain the criterion to be adopted while formulating a project,
4. "Formulation of projects involves scientific procedure"-elucidate.
5. Explain how you identify project? State the methods of scouting for project ideas.
6. What is SWOT analysis? How is it relevant to project formulation?
7. Wxplain the scope and significance of market survey in project formulation.
8. State the concept and significance of Project report.
9. Describe the contents of an ideal project report.
10. Prepare a project report for setting up a small scale unit of your own choice.
11. What is project export? State the scope of projects and the present Indian scenario in this regard.

* * *

UNIT – 3

PROJECT APPRAISAL

Syllabus Covered: Issues relating to Project Appraisal: Market appraisal - Financial Appraisal- Commercial Appraisal – Social appraisal – Feasibility Study.

OBJECTIVES

1. To study the concept and significance of project appraisal
2. To discuss the relevance and scope of market appraisal
3. To discuss the relevance, tools and scope of financial appraisal
4. To discuss the relevance, methods and scope of commercial appraisal
5. To discuss the relevance, steps and scope of social appraisal
6. To discuss the relevance and scope of feasibility appraisal
7. To discuss the relevance and scope of project appraisal

The exercise of project appraisal simply means the "assessment of a project in terms of its economic, commercial, market, social and financial viability in terms of returns and risk". This exercise basically is aimed at determining the viability of a project and sometimes also in reshaping the project so as to upgrade its viability .That is it aims at sizing up the quality of projects and their long-term profitability.

Appraisal of projects by funding institutions is an important exercise for the financial institutions and investing companies in credit decisions. The art of project appraisal puts more emphasis on the economic and technical soundness of the project and it's earning potential than on the adequacy and liquidity of the security offered. Hence, the process of appraisal requires a dynamic approach as it is linked with the present and future. Project appraisal is a scientific tool. It follows specific pattern.

APPRAISAL AREAS

Project appraisal usually involves six areas of appraisal such as market appraisal, technical appraisal, financial appraisal, profitability appraisal, managerial, and social appraisal. These are dealt with one by one here.

62

1. MARKET APPRAISAL

A project must pass the market viability test. Market is the first test. Appraisal of market viability means assessment of the marketability of the end-product. Objectives of technological appraisal

The fundamental objective of appraising a project from the marketing point of view is to satisfy our-self that our [product and service have a clear-cut market to be reached out.

Therefore, at the time of assessment of market viability, the following points require careful consideration.

- Size and prospective growth of the market which the unit is required to cater like nature of population, their purchasing power, their educational background, fashion etc.
- Demand and supply position of the product in the national and inter-national market
- Nature of competition, oligopoly, monopolistic or duopoly or perfect
- Pricing freedom including prospective prices vis-à-vis the quality of the product
- Marketing strategy and selling arrangements made by the unit adequacy of sales fore:
- Export potential
- If the product is an important-substitute, the position regarding existing imports in the country along with the C.T.F value of the imported goods, vis-à-vis cost of product of the unit.
- Logistics and distribution arrangement
- Effective promotional means, advertisement, personnel selling or sales promotion.

What is the anticipated demand for product – Yearly? Five yearly? What is our target market and what are its potentials? What are its features? What are its growth possibilities? What are the Seasonal break-up sales expected? What is the Regional break-up expected sales? What is the Product-wise break up of expected sales? These must be thoroughly studied. Who are our immediate three threatening or close competitors? What is their market share? What is the trend in their share? Can we better our competitive standing in the next 3 years? How

much market share we can grab? Is there export market potentials? How the same can be tapped? What entry strategies are to be thought of?

Market appraisal is very important component. It must cover market by market, product by product, region by region, season by season and so on.

2. TECHNICAL APPRAISAL

A project is considered to be technically feasible, if it is found to be 'sound' from technical and engineering point of view. It is an attempt to find out how well the technical requirements of the unit can be met, which location would be most suitable and what the size of plant and machinery should be.

2.1. Main Objective of Technological Appraisal

The fundamental objective of appraising a project from the technology point of view is to justify the present choice and provide an insight into future technological developments.

Other objectives are:

- to justify the goal compatibility of a project with the preferred technology;
- to seek a better available alternative technology which is both cost effective and efficiently manageable;
- to seek such a technology that can go with existing skill levels of team members or requires little orientation and training programmes;
- to seek a better technology that is not detrimental to the overall environment.

2.2 Classification of Technologies used

The technology that is used in projects can be classified on the basis of:

- Purpose for which it is applied;
- Level at which it is used;
- Nature of skills applied while using the technology.

On the basis of purpose, the technology can be:

- *Manufacturing technology* is generally used in manufacturing industries like textiles, white goods, steel industries, etc.,

- *Extraction technology* is used in extraction of basic raw materials such as oils, petroleum products, coal and pig iron, etc.,
- *Conversion technology* is used in process industries like cement, sugar, etc.
- *Pre-fabricated technology* which is used in construction industries like roads, bridges, and buildings, sheds etc.

On the basis of the level at which technology is used the classification is as follows:

- *Core technology* is the base for any industrial. Engineering and design technology supports the core technology by providing basic layouts and helps in erecting the plant at the required site.
- *Intermediate technology* supports both core technology and engineering and design program with sufficient intermediaries such as heavy machine tools and devices to mobilize input and output and output-of firm and continue to operate the machinery.
- *Component technology* is concerned with supplies or consumables for the core, engineering and even intermediate technology. For example, spare parts of a machine, screws, lubricating oil, belts, electrical connections and other engineering fittings, etc.,

2.3 Essentials of Technological Appraisal

While performing a technological appraisal some of the vital ingredients that need attention are:

- the state of existing and available technology
- training needs of personnel for the present technology and for the new technology;
- availability of technical know-how;
- input base for the technology or its compatibility with the input substitutes;
- future progressive integration of the technology for modifications or refinements;
- wider product-mix and its by-products;
- minimization of waste, loss or scrap in the process or its development;
- factor intensity

- o stability to changes and its relative obsolescence rate;
- o other techno-economic considerations (side effects of technology transfers on the labour lay-off, etc)

Generally, while appraising technical feasibility of any project, the following points are carefully considered.

i. Availability of critical inputs

The critical inputs mean all the basic and operational requirements which make the project viable. These include:

Raw materials: For instance, sugar factories are situated near sugarcane producing areas.

Land: Land is needed. It is good if it is available nearness to market for finished product. It is good, if the units producing heavy bulk finished goods get land situated near the regional market.

- Essential utilities like water, power and fuel.
- Skilled/unskilled labour in the proximity.
- Facility for disposal of effluents.
- Suitable technical and administrative personnel.
- Arrangements for pollution control and for environmental protection.

ii. The capacity of the plant and manufacturing process and suitability of the technology employed.

These call for careful consideration regarding choosing right size of the plant, proper layout and correct technical design. The capacity of the plant should be neither too low rendering it uneconomic nor too high to keep it idle. This has assumed tremendous importance especially in view of the fact that Indian industry has a tendency to have cost and high capital output ratio.

iii. Plant and Machinery

In this regard careful consideration should be given to the following aspects:

- Suitability of plant and machinery for the manufacturing process to be adopted;
- Name and reputation of the supplier of plant and machinery;

- Availability in time so as to avoid any time and cost overrun;
- Reasonableness of their cost;
- Provision for performance guarantee and after sale service by the suppliers.

iv. Project planning and scheduling

Planning should be pragmatic and proper so that the construction and gestation period are estimated properly and there are no time and cost over-run. Of late, many of the projects have failed because of faulty planning at the initial stage and subsequent delay in sanction/release of more funds by banks/financial institutions. Generally, the CPM techniques are used for net-work scheduling.

The various points one has to take into consideration while estimating time are:

- Industrial license
- Permission for collaboration arrangement and the present position regarding signing of the same
- Consent of the appropriate authority for disposal of effluents

3. FINANCIAL APPRAISAL

The basic purpose of financial appraisal is to assess whether the unit will generate sufficient surplus so as to meet the outside obligations and internal growth. Financial appraisal usually examines aspects of:

- The cost of the project i.e., the amount required to complete the project and bring it to normal operation
- The means of financing the cost i.e. the sources from which the required funds are to be raised.

3.1. Cost of Project

The Fixed assets and Current assets required for a business constitute the cost of the project.

The decisions involved here are:

i. the total amount to be committed in assets
ii. the proportion of fixed to current assets
iii. the mix of fixed assets to be acquired
iv. the timing, sourcing and acquisition of fixed assets

v. the evaluation of capital investments as to risk and return features
vi. the mix of current assets
vii. the management of each item of current assets to optimize liquidity and return
viii. the effecting of a healthy portfolio of assets

Actually the above aspects of investment function are concerned with much pregnant issues with which finances of project management is concerned. The first aspect deals with the size of the project, the second and third deal with the level of risk the sponsor is willing to assume, the fourth with appraisal of investment as to their earnings potential, pay back period, etc., the fifth with actual execution of investment decisions, the sixth with the liquidity of the project, the seventh with structural and circulatory aspects of current assets and the eighth with the overall balancing of various investments held by the institution taking into account competing and divergent claims.

Investment function is, concerned capital budgeting and current asset management. Capital budgeting deals with fixed assets management. Investment appraisal, capital rationing and acquisition, maintenance, replacement and renewal of fixed assets come under fixed assets management. Inventory management, receivables management, marketable securities management, cash management and working capital administration come under current assets management. A good deal of planning, organization, coordination and control is needed in every decision area.

3.2. Financing Project

The financing function refers to raising necessary funds for backing up the project investment function. Financing function is dealing the capital structure of the project covers the following:

i. determination of total capital to be raised
ii. determination of the debt-equity rates or the proportion of debt to equity capital and the mix of long term and short-term capital
iii. determination of the level of fixed-change funds like bonds, debentures, loans, etc.
iv. determination of the sources of borrowing - development banks, public or private, domestic or global

v. determination of the securities/charges to be given
vi. determination of the cost of capital
vii. determination of the extent of lease financing
viii. determination of the degree of sensitivity of earnings per share to earnings before interest and taxation
ix. determination of the method of raising capital-public issue or private placement; under-writing and brokerage, rights issue and the like
x. the legal restrictions, if any, on the scale, form, timing and other aspects of raising capital

Like investment function, financing function also affects the liquidity (less short term debt means more liquidity), solvency (more equity means more solvency), earnings potential (low cost capital means more earnings), flexibility of capital structure (more equity, more flexibility), owner's control on affairs (more debt and less equity mean more concentration of control on the affairs of the institution) and so on. That is, financing function is equally influencing the fortunes of the business greatly.

3.3. Factors in Financial Availability

After computing the cost of the project and means of finance, the various factors required for assessment of financial viability which a banker should carefully examine, are as under:

i. Reasonableness of cost of project: The project cost should be reasonable . However, assessing reasonableness of the project cost is a very difficult and delicate task. Here, generally, the technique of inter-firm comparison is used which compares the project cost estimates with the cost of comparable units in the same industry.

ii. Debt-Equity ratio: This is a very important consideration as there should not be mismatch between the external debt (long-term) and the equity of the enterprise.

Debt-equity ratio = Long term debt / Own equity

Equity consists of: Equity share capital; Preference share capital redeemable after 12 years, Free reserves and Subsidy

Long term debt consists of: Long term loans raised or proposed to be raiseu, Debenture and Preference shares redeemable before 12 years.

Maximum desirable ratio is 3 : 1 for small scale industries and 2 : 1 for medium scale industries (up to cost of project of 20 cr.)

However, for heavy capital intensive industries like cement plant, fertilizer plant or ship breaking unit, this can be further relaxed.

Promoter's contribution: It is very important to know about the promoter's stake in his own enterprise. As such a minimum amount of promoter's contribution is insisted for consideration of any proposal. From the point of view of all India financial institutions, generally, the minimum contribution of the promoter should be as under.

For units situated in 'A' category districts= 12.5%
For units situated in 'B ' category districts= 17.5%
For units situated in 'C' category districts= 20.0%
For any other industrial unit = 22.5%

Sensitivity Study: This carried out to see whether the project would be able to serve its debts and give reasonable return under less-optimistic conditions as well. For determining, profitability of the project generally projections are obtained over the entire repayment period (say 7 to 10 years) in the following functional areas:

- Cost of Production
- Profitability
- Cash flow
- Debt service coverage ratio
- Break even point

The appraiser should satisfy himself about the reasonableness of the basic assumption on which the above projections are made. The important assumptions generally looked into are:

- Capacity build up
- Cost of raw materials
- Estimates of salaries & wages
- Estimates of administrative expenses'

- Expected selling price
- Provisions made for depreciation
- Provisions for various taxation liabilities

The assumptions should be reasonable find realistic. In case, the assumption are not pragmatic, the can be got changed by the bank and fresh figures can be compiled. But the basic consideration the banker should have it that the cash generation position of the unit should be quite comfortable throughout the repayment period. An ideal debt service coverage aimed at is 2:1.

4. COMMERCIAL APPRAISAL

Commercial appraisal is an aspect of financial appraisal and it is concerned with issues of, profitability, pay-back, present value, IRR, risk, return, break-even point, margin of safety and so on.

4.1. Requisites for Commercial Appraisal of Capital Projects

The computation of profit after tax and cash flow are much relevant in evaluation of projects. Hence this is presented here as a prelude to better understanding the whole process.

Say in fixed assets at time zero, you are investing $ 2000,000. You have estimated the following for the next 4 years.

Year	*Expected Sales (units)* (Q)	*Expected Selling Price* (P)	*Tax* (T)	*Expected rate per unit* (V)	*Fixed expenses variable cost (excluding depreciation)* (F)
		$		$	$
1	30,000	200	30%	100	1200,000
2	30,000	250	30%	120	1300,000
3	20,000	300	40%	150	1400,000
4	21,000	300	40%	200	1500,000

With this information, we can estimate profit after tax for the business. For that, apart the given variable expenses and fixed expenses, depreciation of the fixed assets has to be considered. The annual value of depreciation is given by the cost of fixed assets divided by number of years of life. In our case the figure comes to $ 2000,000/4 = $ 500,000.

The calculations are given in three stages, viz., computation of profit before tax (PBT), profit after tax (PAT) and cash flow.

The profit before tax (PBT) for a period is given by: (selling price per unit - variable cost per unit) x (No. of units sold) - Fixed expenses - Depreciation. So, for the 1st year PBT = (200-100)(30,000) – 1200,000 - 500,000 = 3000,000 - 1200,000 -500,000 =$ 1300,000. Table below gives the working and results.

Year	(P – V) $	*	(Q)	-	F$	- Dep.$	=	PBT $
1	(200-100)	*	(30,000)	-	1200,000	- 500,000	=	1300,000
2	(250-120)	*	(30,000)	-	1300,000	- 500,000	=	2100,000
3	(300-150)	*	(20,000)	-	1400,000	- 500,000	=	1100,000
4	(300-200)	*	(21,000)	-	1500,000	- 500,000	=	100,000

Profit after tax (PAT) for the different years is obtained by subtracting tax from the PBT. Instead a simple formula can be used, as follows.

Profit after tax = PAT = PBT (1-Tax Rate)

So, for the first year PAT = 1300,000 (1-30%) = 1300,000 (0.7) = 910.000. Similarly for the other years the profit figures can be obtained in table below.

Year	PBT	Tax rate	Tax= (PBT) x (Tax Rate)	PAT = (PBT – Tax) ***OR*** PBT (1 – TR)
1	1300,000	30%	390,000	910,000
2	2100,000	30%	630,000	1470,000
3	1100,000	40%	440,000	660,000
4	100,000	40%	40,000	60,000
Total	**4600,000**		**1500,000**	**3100,000**

Cash-flow from operations is equal to PAT plus depreciation. Table below gives cash flow from business, annual and cumulative in the last two columns.

Year	PAT	+	DEP	=	Cash Flow	Cumulative Cash Flow
1	910,000	+	500,000	=	1410,000	1410,000
2	1417,000	+	500,000	=	1970,000	3380,000
3	660,000	+	500,000	=	1160,000	4540,000
4	60,000	+	500,000	=	560,00	5100,000

4.2. Techniques of Profitability Evaluation

There are several techniques of evaluation of capital investments. Some important ones are discussed here. *Payback period, accounting rate of return, net present value, internal rate of return, decision tree technique, sensitivity analysis, simulation analysis and capital asset pricing model (CAPM)* are certain methods of appraisal.

Simple Techniques: Payback period, accounting rate of return, net present value and internal rate of return are simple techniques followed here.

Some problems involving simple techniques of evaluation are attempted below.

Illustration 1: Let us evaluate the case in terms of the simple techniques of evaluation of capital investment.

(a) Payback Period (PBP) Method

Pay back period refers to the number of years one has to wait to go back the capital invested in fixed assets in the beginning. For this we have to get the cash flow from business. If the cash flow is uniform year after year, the formula for cash flow is : Original Investment / Annual Cash Flow. If the cash flow is not uniform, the following formula is used:

$$\sum_{t=1}^{n} CF_t - I = 0$$

where `t' = 1 to n, I = initial investment, $CF_t$ = cash flow at time `t' and t = time measured in years.

Facts of the case: Initial Investment $ 2000,000. Cash flows 1st through 4th years: $ 1410,000, $ 1970,000, 1160,000 and $560,000. So, after 1st year a sum of $ 1410,000 is returned. By next year a sum of $ 1970,000 is returned. But to fully get back the Initial Investment $ 2000,000, we have to get back only $ 590,000 (i.e., $2000,000 - $1410,000). So, in the second we have to wait only for part of the year to get back $ 590,000. The part of the year = 590,000/1970,000 =0.299 or approximately 0.30. That is, pay back period is 1.30 years or 1 year, 3 months and 19 days. In general pay-back period is given by `n' in the equation.

Normally, business as want projects that have least pay back period, because the invested money is got back very soon. As future is risky, earlier one gets back the money invested the better for him. Some businesses fix a maximum limit on pay back period. This is the cut-off pay-back period, serving as the decision criterion. Accordingly a pay back period ceiling of 3 years means, only projects with payback period equal to or less than 3 years will be accepted.

Merits of Payback Period

i. It is cash flow based which is a definite concept
ii. Liquidity aspect is taken care of well
iii. Risky projects are avoided by going for low gestation period projects
iv. It is simple, *common sense oriented.*

Demerits of Payback Period

i) Time value of money is not considered as earnings of all years are simply added together.
ii) Explicit consideration for risk is not involved.
iii) Post-payback period profitability is ignored totally.

(b) Accounting Rate of Return (ARR) Method : Here the accounting rate of return (ARR) is calculated. It is also called as average rate of return. To compute ARR average annual profit is calculated first. From the PBT for different years (as in table) average annual PBT can be calculated.

The average annual PBT = Total PBT / No. of years

AAPBT = 4600,000/4 = 1150,000.

ARR = AAPBT / Investment **(or)** AAPBT / Average Investment

= 1150,000 / 2000,000 = 57.5% **(or)** = 1150,000 / 1000,000

= 115%

Note: Average Investment= (Original Investment + Salvage Value)/2 = (2000,000 + 0)/2 = 1000,000.

Merits of ARI

i. It is simple, common sense oriented

ii. Profits of all years taken into account

Demerits of ARR

i) Time value of money is not considered

ii) Risk involved in the project is not considered

iii) Annual average profits might be same for different projects but accrual of profits might differ having significant implications on risk and liquidity.

iv) The ARR has several variants and that it lacks uniform understanding.

A minimum ARR is fixed as the benchmark rate or cut-off rate. The estimated ARR for an investment must be equal to or more than this benchmark or cut off rate so that the investment or project is chosen.

(c) Net Present Value (NPV) Method

Net present value is computed given the original investment, annual cash flows (PAT + Depreciation) and required rate of return, which is equal to the cost of capital. Given these, NPV is calculated as follows:

$$NPV = -I + \sum_{t=1}^{n} CF_t / (1+k)^t$$

Where, I = Original or initial investment, CF_t = annual cash flows

K = cost of capital and t = time measured in years.

For the problem we have done under the pay back period method we can get the NPV, taking k = say 10% or 0.1. Then the

$$NPV = -I + [CF_1 / (1+k)^1 + CF_2 / (1+k)^2 + CF_3 / (1+k)^3 + CF_4 / (1+k)^4]$$

25

$= -2000,000 + [1410,000/1.1 + 1970,000/1.1^2 + 1160,000/1.1^3 + 560,000/1.1^4]$

$= -2000,000 + [1410,000 \times 0.909 + 1970,000 \times 0.826 + 1160,000 \times 0.751 + 560,000 \times 0.683]$

$= -2000,000 + [1281,828 + 1628,099 + 871,525 + 379,042]$

$= -2000,000 + 4160,494 = \$ 2160,494.$

If the NPV = 0 or greater than zero, the project can be taken. In case there are several mutually exclusive projects with NPV > 0, we will select the one with highest NPV. In the case of mutually inclusive projects you first take up the one with highest NPV, next the project with next highest NPV, and so on as long as your fund for investments lasts. The factor "k" need not be same for all projects. It can be high for projects whose cash flows suffer greater fluctuations due to risk, and lower for projects with lower fluctuation.

(d) Internal Rate of Return (IRR) Method

Internal Rate of Return (IRR) is the value of "k" in the equation, $- I + [\Sigma CF_t / (1 + k)^t] = 0$. In other words, IRR is that value of "k" for which aggregated discounted value of cash flows from the project is equal to original investment in the project. When manually computed, "k" i.e., IRR is got through trial and error and if need be, adopting a sort of interpolation. Suppose for a particular value of k, $- I + \Sigma CF_t / (1 + k)^t > 0$, we have to use a higher 'k' in our next trial and if the value is < 0, a lower 'k' has to employed next time. Then you can interpolate k. The value of 'k' thus got is the IRR. For the project in question (dealt under NPV), the IRR is worked out as follows:

If we take, k = 50%, then $\Sigma CF_t / (1 + k)^t$ comes to 2269,877, i.e., $[1410,000/1.5 + 1970,000/1.5^2 + 1160,000/1.5^3 + 560,000/1.5^4]$. This is higher than the 'I' by 269,877. so, 'k' is enhanced to 60%. Then $1410,000/1.6 + 1970,000/1.6^2 + 1160,000/1.6^3 + 560,000/1.6^4$, i.e., $\Sigma CF_t / (1 + k)^t$ comes to 2019,433. This is higher than 'I'. So, we have to try at still higher discount rate, say 61%. The PV comes to \$ 1997,083. Now, we can take the interpolated value as the IRR, which is between 60% and 61%.

$IRR = 60\% + [(2019,433 - 2000,000)/(2019,423 - 1997,083)] \times (61\% - 60\%)$

$= 60\% + [(19,433/(22,350)] \times 1\% = 60\% + 0.869\% = 60.869\%$

If the computed IRR is equal to or greater than cost of capital, the project will be selected. Otherwise, it is rejected. For mutually exclusive projects, project with highest IRR, subject to it being equal to or greater than cost of capital, will be chosen. For mutually inclusive projects, you start taking up first the project with highest IRR, next, the next highest IRR project and so on subject to (i) the IRR is greater than or equal to cost of capital and (ii) you have investible fund.

(e) Risk Analysis in the case of Single Project

Project risk refers to fluctuation in its payback period, ARR, IRR, NPV or so. Higher the fluctuation, higher is the risk and vice versa. Let us take NPV based risk.

If NPV from year to year fluctuate, there is risk. This can be measured through standard deviation of the NPV figures.

Std. Deviation = $[(R_i-R)^2/(n-1)]^{1/2}$, where R_i is the different period returns for the n periods considered, and R is the mean of these returns. Suppose the expected NPV of a project is \$ 1800,000, and Std. deviation of \$ 600,000. The coefficient of variation **(CV)** is given by std. deviation divided by NPV. C.V = \$ 600,000/ \$1800,000 = 0.33

(f) Risk-Return Analysis for Multi Projects:

Indivisible Projects: Indivisible projects cannot be divided into parts or fractions. Either you have to take a project in full or leave it out fully.

When multiple projects are considered together, what is the overall risk of all projects put together? Is it the aggregate average of std. deviation of NPV of all projects? No, it is not. Then What? Now another variable has to be brought to the scene. That is the correlation coefficient between NPVs of pairs of projects. When two projects are considered together, the variation in the combined NPV is influenced by the extent of correlation between NPVs of the projects in question. A high correlation results in high risk and vice versa. So, the risk of all projects put together in the form of combined std. deviation is given by the formula:

$\sigma_p = [\Sigma P_{ij} \sigma_i\sigma_j]^{1/2}$ where,

σ_p is the Combined portfolio std. deviation

P_{ij} is the correlation between NPVs of pairs of projects

$\sigma_i\sigma_j$ is the std. Deviation of i^{th} and j^{th} projects, i.e., any pair of projects taken at a time.

Illustration: Three projects have their std. deviations as follows: $ 4000, $ 6000 and $ 10000. The correlation coefficients for different pairs are 1&2: 0.6, 1&3: 0.78 and 2&3: -0.5. What is the overall std. deviation of the portfolio of projects?

$$\sigma_p = [\Sigma P_{ij}\,\sigma_i\sigma_j]^{1/2} = [\sigma_1^{\,2} + \sigma_2^{\,2} + \sigma_3^{\,2} + 2P_{12}\,\sigma_1\sigma_2 + 2P_{23}\,\sigma_2\sigma_3 + 2P_{13}\,\sigma_1\sigma_3]^{1/2}$$

$$= [4000^2 + 6000^2 + 10000^2 + (2 \times 0.6 \times 4000 \times 6000) + (2 \times 0.78 \times 6000 \times 10{,}000) + (2 \times (-0.5) \times 10{,}000 \times 4000)]^{1/2}$$

$$= [16{,}000{,}000 + 36{,}000{,}000 + 100{,}000{,}000 + 28{,}800{,}000 + 93{,}600{,}000 - 40{,}000{,}000]^{1/2}$$

$$= [234{,}400{,}000]^{1/2} = \$\ 15{,}310.$$

What is the return from these multiple projects? This is simple. It is the aggregate NPVs. Suppose the three projects have NPVs of $ 16,000, $ 20,000 and $ 44,000. The combined NPV $= 16,000 + 20,000 + 44,000 = $ 80000.

The combined coefficient of variation = combined std. deviation/ combined NPV = $ 15340/$ 80000 = 0.19 = 19%. If we take the correlation factor unadjusted-combined std. deviation and combined NPVs, the coefficient of variation would have been: 20000/80000 = 0.25 = 25%. The correlation factor has resulted in reducing overall portfolio risk from 25% to 19%. This results essentially when there is low degree of positive correlation among the projects. The reduction in portfolio risk would have been more, if there is higher negative correlation among the projects.

Divisible Projects

Divisible projects can be divided into parts or fractions and you can take any project in full or in fractions. Here in portfolio risk computation, the 'w_i' the weight factor, will be introduced.

Illustration: Three projects involve a total outlay of $1000,000. Investment in any one project can be any amount, subject to the total outlay. The estimated return from the projects are 14%, 16% and 20%. The std. deviation of returns are

5%, 10% and 10%. The correlation coefficients are 1&2: 0.4, 2&3: 0.6 and 1&3: 0.2. A portfolio with weight 0.2, 0.3 and 0.5 for the three projects, respectively, is constructed. Find the portfolio return and risk.

Solution: The portfolio or combined return is simply the weighted return of the projects. This is given by: Σ WiRi where wi - is the weight (0.2, 0.3 and 0.5 for the three projects respectively) and Ri (14%, 16% and 20%) - is the respective project return.

R_p= Portfolio return = Σ WiRi = 0.2 x 14% + 0.3 x 16% 0.5 x 20%

= 2.8% + 4.8% + 10% = 17.6%

σ_p = Portfolio risk = $[\Sigma\Sigma W_i W_j \rho_{ij} \sigma_i \sigma_j]^{1/2}$

$= [W_1^2\sigma_1^2 + W_2^2\sigma_2^2 + W_3^2\sigma_3^2 + 2W_1W_2\rho_{12}\sigma_1\sigma_2 + 2W_2W_3\rho_{23}\sigma_2\sigma_3 + 2W_1W_3\rho_{31}\sigma_1\sigma_3]^{1/2}$

Putting the given values, we get that,

$\sigma_p = [\ 1 + 9 + 25 + 2.4 + 18 + 2]^{1/2} = [57.4]^{1/2} = 7.576\%.$

4.3. Incremental Cash Flow

When replacements are involved, the cash flow from new machine need to be adjusted for cash flow the old machine assuming it were in continuous use and we need to get the incremental cash flow. Incremental investment flow after considering the sales value of old machine adjusted for any tax credits (in the case of sale at a loss) or tax debits (in the case sales at a profit) is to be first computed. Incremental operating cash flow need to then computed. Taking the incremental cash outflow and inflow evaluation need to be made.

Illustration :

A firm is currently using a machine purchased two years ago for $ 1400,000. It has further 5 years of life. It is considering replacing of the machine with a new one, which will cost $ 2800,000. Cost of installation $ 200.000. Increase in working capital is $ 400,000. The profits before tax and depreciation are as follows for the two machines.

Year	1	2	3	4	5
Current Machine ($.)	600,000	600,000	600,000	600,000	600,000
New Machine ($.)	1000,000	1200,000	1400,000	1800,000	2000,000

The firm adopts fixed installment method of depreciation. Tax rate is 40% and capital gain tax is 10% on inflation un-adjusted capital gain.

Is it desirable to replace the current machine by the new one, taking the resale value of old machine at $ 1600,000 at present and using, PBP, ARR, NPV and IRR? (For NPV method take 10% as discount rate, for ARR method cutoff rate is 15% and for PBP method cutoff period is 3.5 years).

Solution

First we have to calculate the size of investment needed. This includes, purchase cost of new machine, cost of installation and working capital addition needed, reduced by net sale proceeds (after capital gain tax) of old machine.

The old machine's original cost		= $. 1400,000
Depreciation for the past 2 years		
@ $. 2,00,000 [14,00,000 I life 7 years]		$. 400,000

	Depreciated Value	$. 1000,000
	Sales Value	$. 1600,000
	Total gain	$. 600,000

This gain has two components, capital gain and revenue gain. Capital gain = $. Sale Value - original cost = $ 1600,000 - $ 1400,000 = $ 200,000. Revenue gain = Total gain - capital gain = $ 600,000 - $ 200,000 = $ 400,000. Tax on revenue gain = $ 400,000 x 40% = $ 160,000. Tax on capital gain = 200,000 x 10% = 20,000. Therefore, after tax adjustment, net sales proceeds of old machine = $ 1600,000 - $ 20,000 - $ 160,000 = $ 1420,000. Now we can compute net investment at time zero, i.e. at beginning as follows:

Cost of new machine	:	$. 2800,000
Add installation cost	:	$. 200,000
Cost of machine	:	$. 3000,000
Add. Addl. Working Capital	:	$. 400,000
		$. 3400,000
Less net sale proceeds of old machine:		$. 1420,000
Net Incremental Investment	:	$. 1980,000

Now we have to calculate change or increment in cash flow because of the firm going for replacement of old machine by new one. For this purpose, what is the cash flow from new machine and what would be the cash flow from old machine had the firm continued with that must be computed. The difference of former over the latter is the change in cash flow.

First let us take cash flow from new machine

Details	Year 1	Year 2	Year 3	Year 4	Year 5
PBT&D	1000,000	1200,000	1400,000	1800,000	2000,000
Less depreciation (3000,000 /5)	600,000	600,000	600,000	600,000	600,000
PBT	400,000	600,000	800,000	1200,000	1400,000
Less Tax @ 40%	160,000	240,000	320,000	480,000	560,000
PAT	240,000	360,000	480,000	720,000	840,000
Add depreciation	600,000	600,000	600,000	600,000	600,000
Add working capital Recovery at year 5	-	-	-	-	400,000
~~(1)~~ Cash flow	840,000	960,000	1080,000	1320,000	1840,000

Second, let us take cash flow from old machine

Details	Year 1	Year 2	Year 3	Year 4	Year 5
PBT&D	600,000	600,000	600,000	600,000	600,000
Less depreciation (14,00,000 / 7)	200,000	200,000	200,000	200,000	200,000

PBT	400,000	400,000	400,000	400,000	400,000
Less Tax @ 40%	160,000	160,000	160,000	160,000	160,000
PAT	240,000	240,000	240,000	240,000	240,000
Add depreciation	200,000	200,000	200,000	200,000	200,000
(2) Cash flow	440,000	440,000	440,000	440,000	440,000
Increment cash Flow = (1) – (2)	400,000	520,000	640,000	880,000	1400,000
Cumulative Δ cash flow	400,000	920,000	1560,000	2440,000	3840,000

Note: The symbol 'Δ' stands for incremental value.

a) Payback Period (PBP) Method Evaluation

Fresh additional investment needs is \$. 1980,000. Up to 3 years from now, \$. 1560,000 cumulative cash flow is got. So, PBP is 3 years plus that fraction of 4[th] year to recover balance \$. 420,000 (i.e., \$. 1980,000 - \$. 1560,000). The fraction of year = 420,000/880,000 = 0.4772 a year. So, pay back period = 3.4772 years or 3 years and 5.8 months. The project's PBP of 3.4772 years is less than the cut off period is 3.5 years. So, replacement is advisable.

b) ARR Method of Evaluation

For ARR method, we have to get incremental PBT. This is computed as follows.

Details	Year 1	Year 2	Year 3	Year 4	Year 5
PBT: New machine	400,000	600,000	800,000	1200,000	1400,000
PBT: Old machine	400,000	400,000	400,000	400,000	400,000
□PBT	0	200,000	400,000	800,000	1000,000

Average annual ΔPBT = ΣΔ PBT/5 = 2400,000/5 = \$480,000

Average Annual Δ investment = (ΔInvestment + Working capital)/2

= (1980,000 + 400,000)/2 = 1190,000

ARR = Average annual ΔPBT/ Average Annual Δ investment = (480,000 / 1190,000) x 100 = 40.34%

Note: Working capital $ 400,000 introduced at the beginning is recoverable at the end of the last year and this is treated as salvage value.

c) NPV Method of Evaluation (Discount rate 10%)

$$NPV = \sum_{t=1}^{n} CF_t / (1 + k)^t - I$$

$= (400,000/1.1 + 520,000/1.1^2 + 640,000/1.1^3 + 880,000/1.1^4 + 1400,000/1.1^5) - 1980,000$

$= (363,636 + 429,752 + 480,841 + 601,051 + 869,296) - 1980,000$

$= 2744,576 - 1980,000 = \$ 764,576$

As NPV > 0, replacement is advised.

d) IRR Method of Evaluation

NPV at 10% discount rate is +ve. This itself shows that the IRR > 10%. So, the replacement is advised. Any how, we can calculate IRR too. Let us take the assumed IRR as 20%. At 20%, the NPV is: 2051,826 - 1980,000 = 71,826. So, IRR is still higher. Let using at 22% as assumed IRR. The NPV = 1944,920 - 1980,000 = - 35,080. Since the NPV at 22% is negative and at 20% it is positive, IRR is > 20% but < 22%. We can interpolate as follows:

IRR = 20% + (71826 / (71826 + 35080)) x 2% = 20% +1.34 = 21.34.

As the IRR at 21.34% is > cut-off IRR of 10% replacement is advised.

Illustration

A company brought a machine 2 years earlier at a cost of $ 60,000 and estimated its useful life as 12 years in all. Its current market price is $ 25,000. The management considers replacing this machine with a new one, life 10 years, price $ 100,000. The new machine can produce 15 units more per hour. The annual operating hours are 1,000 both for new and old machines. Selling price per unit is $ 3. The new machine will involve addl. material cost $ 6,000 and labour $ 6,000 p.a. But savings in cost of consumable stores of $ 1,000 and repairs by $ 1,000 p.a. will result. The corporate tax rate is 40%. Advice on the replacement assuming additional working capital of $ 10,000 introduced now, can be redeemed at 10 years later, cost of capital as 10% and SLM of depreciation, using NPV method.

Case Discussion

i) Computation cash outflow at present

Cash for new machine	:	$	100,000	
Add. Addl. Working capital	:	$	10,000	110,000
Less: (i)Sales value of old machine:		$	25,000	
(ii) Tax shield on loss of old machine (book value – market value) x tax rate [(50,000 -25,000) x40%] :		$	10,000	(35,000)
				=75,000

ii) Computation of Addl. Gross Income

Addl. Production per annum = Hours of operation x Addl. Output per hour
= 1,000 x 15 = 15,000

Addl. Gross income per annum = Addl. Production p.a. x unit price
= 15,000 x $3 = $ 45,000

From 1 year to 10th year, $. 45,000 addl. income is thus predicted.

iii) Cash flow computation

Details	Years 1 to 9	Year 10
Addl. Gross income	45,000	45,000
Add: Savings in consumable stores & repairs	2,000	2,000
	47,000	47,000
Less: Addl. Material & Labour cost	12,000	12,000
PBD &T	35,000	35,000
Less: Addl. Depreciation (10000-5000)	5,000	5,000
PBT	30,000	30,000
Les Tax @ 40%	12,000	12,000
PAT	18,000	18,000
Addl. Depreciation	5,000	5,000
Add. Working capital recovery	--	10,000
Cash flow	23,000	33,000

84

$$NPV = \sum_{t=1}^{n=9} CF_t / (1+k)^t + CF_{10} / (1+k)^{10}$$

Since uniform cash flow is found throughout 1st to 9th year, the NPV formulates can be slightly modified as:

$$NPV = [ACF \Sigma 1 / (1+k)^t + CF_{10} / (1+k)^{10}] - I$$

$$= 23{,}000 [1/1.1 + 1/1.1^2 + \ldots 1/1.1^9] + [33{,}000 (1/1.1)^{10}] - 75{,}000$$

$$= (23{,}000 \times 5.759) + (33{,}000 \times 0.386) - 75{,}000$$

= 145,195 – 75,000 = $ 70195. The replacement is advised.

Illustration

A company has 3 investment proposals. The expected PV of cash flows and the amount of investment needed are as below:

Project	Investment required (000s)	PV of cash flow(000s)
1	$ 200	$ 290
2	$ 115	$ 185
3	$ 270	$ 400

If projects 1 and 2 are jointly taken, there will be no economics or diseconomies. If projects 1 and 3 are undertaken, economies result in investment and combined investment will be $ 440 thousand. If 2 and 3 are combined, the combined PV of cash flow will be $ 620 thousand. If all the 3 projects are combined, all the above economics will result but diseconomy in the form of additional investment of $ 125 thousand will be needed. Find which projects be taken.

Solution

Projects (1)	Invt. Needed (2)	PV of cash flows (3)	NPV 4 = (3) – (2)
1	200,000	290,000	90,000
2	115,000	185,000	70,000
3	270,000	400,000	130,000
1&2	315,000	475,000	160,000

1&3	440,000	690,000	250,000
2&3	385,000	620,000	235,000
1,2&3	680,000#	910,000*	230,000

Decision: Projects 1 & 3 will be chosen as the **NPV is higher**.

Some Workings:

Investment for 1,2 &3 = Investment for 1&3 + Investment for 2 + Addl. Investment

= 440,000 + 115,000 + 125,000 = $680,000.

****PV of cash flows for 1,2&3*** = PV of cash flows of 2 &3+PV of cash flow of 1

= 620,000 + 290,000 = $910,000.

4.4 Parent Vs Project Cash Flow

In the case of group companies or MNCs, the project cash flow differs from parent's cash flow (aggregate of parent's own cash flow and that of subsidiaries). So lateral summation cannot be made just like that.

a. Project cash flow: Normally project cash flow is simply based on the total investment needed, its operating results resulting in sales, variable cost, fixed cost, depreciation, taxes, working capital needed in the beginning and retrieved at the end, the salvage value of the project's fixed assets, etc. The computation of project cash flow will not consider any adjustments for synergies (additional sales achieved by the parent due to the establishment of the subsidiary) obtained by the group or the cannibalism (lost sales because of the formation of the subsidiary) suffered, difference between market price and transfer price charged for internal transactions, taxes paid or saved by the parent on royalties, management fees, etc received from subsidiary, exchange rate fluctuations, and so on. As a result a project's evaluation is devoid of reality.

b. Parent's Cash Flow: The project cash flow is not to be laterally added to the parent's cash flow to arrive at combined cash flow, because the parent suffers cannibalism or enjoys synergy due to the subsidiary, tax incidences on receipts from and payments to the subsidiary and so on. *Therefore, Project cash flow* □

Parent's cash flow. So a project assessed without adjustments for the factors causing difference between project and parent cash flow will not reveal the correct picture of the real worth of the project. There fore adjustments are called for.

c. Adjustments Called for: A project's cash flow differs from a parent's incremental cash flow. Several factors stand behind this deviation as mentioned above. Hence adjustments of project's cash flow for these factors are called for. Some of the factors for which adjustments are required are as under:

Cannibalism Factor: An Indian firm has been supplying software for an US computing company. Now the Indian firm is floating its US subsidiary. The cash flow of the US subsidiary of the Indian firm needs adjustment for the replaced export earnings of the Indian parent firm. The new US subsidiary eats away its Indian parent's export earnings. Hence the cannibalism factor. The US subsidiary's cash flow must be reduced by the lost export earnings of its parent.

Synergy Factor: The new US subsidiary of the Indian parent, by its high and contacts world over, enabled the Indian parent to export to Europe and Japanese markets. These exports are otherwise impossible to have been clicked. This is the synergy factor, which is opposite to cannibalism factor. The US subsidiary's cash flow must be inflated

Opportunity Cost Factor: Say, the Indian parent acquired long ago property for $ 20 mn in US, where the subsidiary now is carrying its operations. Presently market value of the property is $ 100 mn, though book value is only $ 20 mn. The opportunity cost of the property, namely its market value, must be considered for evaluation of the subsidiary. The capital outlay of the project must be based on the market value of the property used by it.

Release of Blocked Factors: Suppose, US tax authorities had given a tax credit, being refund of excess property tax paid on the property, amounting to $ 2 mn. The money cannot be repatriated in India. But can be used for investment in US only. Since the commissioning of the US subsidiary has given an opportunity to activate the blocked fund, which is otherwise sunk fund, the initial cost of the US subsidiary can be reduced by the extent the released level of blocked funds.

Interest Free or Concessional Loan: Suppose the US Govt. gives a $ 60 mn loan repayable $ 20 mn p.a. over next 3 years, for the purpose of the Indian parent, in appreciation of the US subsidiary's strategic importance to US

economy, free of interest. The excess of $ 60 mn over the present value of debt repayments affected at end of year 1, year 2 and year 3, is a benefit accruing to the parent. But, the subsidiary must be given credit, in turn, by the parent.

Transfer Pricing

Transfer pricing refers to pricing product/service sales/purchases within group concerns. Should transfer pricing be at cost or at a profit, is a debatable issue. If intra concern transfers are made at cost, though it may be objective it conceals the efficiency of both the transferor and transferee. If intra-concern transfers are to be made at a profit the question of reasonable profit is to decided and there is no consensus as to what reasonable profit percentage.

The affiliates of an MNCs are closely integrated. As such, they can easily manipulate trade for maximization of the global profit, by reducing group tax outgo. They do it by means of under-invoicing and over-invoicing which are called `transfer pricing'. For instance, if the affiliate has to transfer funds to the parent organization through the price channel, the goods coming from the parent company are over-priced or the goods going from the affiliate are under-priced. As to MNCs, transfer pricing has a great import as it can be used to reduce tax gain by shifting profit from high-tax zone to low-tax zone, to reduce duty levy by similar shifting and to avoid exchange controls.

The loss caused by transfer pricing may be borne by various groups in the host country: the government (loss of tax revenue), local shareholders (loss of legitimate share profit), trade unions (reduced wages), consumers (higher prices) and even other producers through worsening foreign exchange situation. Suppose the Indian parent reduces its corporate tax liability through transfer pricing mechanism. The tax saved by the parent has to be used to inflate the cash flow of the US subsidiary project.

Consider the case given below where tax liability is reduced through transfer pricing. Say, the parent company - 'A' is producing a product and transfers the same to its subsidiary - 'B'. Assume 'A' is high tax zone and 'B' is in low tax zone. In this situation, booking more profits through 'B' will help reaping maximum tax gain for the group as a whole. Let cost of production per unit is $ 10. And 'A' is annually sending 1,00,000 units to 'B' which sells at $ 25 a piece. If 'A' adopts a low mark up policy say cost + 40% what is the tax liability for individual firms and the group when 'A' is subjected to 50% tax and

'B' is subjected to 30% tax? When a high mark up of Cost + 80% is adopted what is the tax on profit? Consider table given below.

Transfer Pricing: Comparative tax scenario Without Import Duty

(Fig. in $ 000s)

	40% mark up			***80% mark up***		
Details	***Parent***	***Subsidiary***	***Effective Total***	***Parent***	***Subsidiary***	***Effective Total***
Revenue	1400	2500	2500	1800	2500	2500
Cost of goods sold	1000	1400	1000	1000	1800	1000
Gross profit	400	1100	1500	800	700	1500
Other expenses	100	100	200	100	100	200
Income before Tax	300	1000	1300	700	600	1300
Tax (50% for parent or 30% for Subsidiary.)	150	300	**450**	350	180	**530**
Profit after tax	**150**	**700**	**850**	**350**	**420**	**770**

A low mark up policy helps the group to reduce tax liability to $ 4,50,000 and maximize after tax profit to $ 8,50,000 as against a high mark up policy when after tax profit stands reduced to $ 7,70,000. The logic is simple. The group stands to gain by shifting more profit booking at the low-tax zone, namely at the subsidiary by marking a lower level of profit on sales from the parent.

4.5. Cash Flows from different perspectives

Cash flow computation is basic to evaluation of projects. The cash flow can be seen from equity view point, long-term funds view point and total funds view point. An illustration details the same.

The project appraisal division of a leading car manufacturing company is considering to take up a new project unrelated to its existing range of products. It has prepared the market and technical feasibility report. The project has a life of 5 years. The financial estimates relating to project cost, financing plan, revenue and operating costs and other information are given as under:

The estimated project cost is Rs. 160 crores.

It consists of Rs. 96 crores of fixed assets and Rs. 64 crores of working capital margin.

The financing plan is as under:

Equity investment	Rs. 32 crores
Term loans	Rs. 64 crores
Bank finance for working capital	Rs. 32 crores
Trade credit	Rs. 32 crores

The estimated sales and operating costs (excluding depreciation) are Rs. 192 crores and Rs. 144 crores per annum respectively.

The depreciation on fixed assets would be @ 20% p.a based on the written down method.

The salvage of fixed assets Rs. 31.47, and current assets will be equal to their book values.

The principal of the term loan will be repaid in four equal annual installments of Rs. 16 crores each. The first installment will fall due at the end of the second year and the last installment at the end of the 5th year. The outstanding term loan would carry interest @ 12% p.a. The levels of short term bank finance and trade credit will remain at Rs. 32 crore level each year, on account of the roll-over phenomenon, till they are paid back at the end of the 5th year. The short term bank finance will carry interest rate of 20% p.a.

The company falls in the 50% tax bracket.

,u are required to:

a) assess the financial viability of the project from equity, long-term funds and total funds points of view.

b) prepare a financial feasibility report to be submitted to the management for final consideration.

Solution (a) The financial viability of the above project can be checked by preparing the cash flow projections for a period of five ears from equity, long-term and total funds perspectives.

Statement of Cash flow Projections for the New Project - (Rs Crs)

Years	*0*	*1*	*2*	*3*	*4*	*5*
Total funds	(160)					
Equity	(32)					
Fixed assets	(96)					
Working capital margin	-					
Revenue (R)		192.00	192.00	192.00	192.00	192.00
Operating costs		144.00	144.00	144.00	144.00	144.00
Depreciation		19.20	15.36	12.28	9.82	7.86
Interest on long term funds		7.68	7.68	5.76	3.84	1.92
Interest on short term borrowings		6.40	6.40	6.40	6.40	6.40
Total cost (C)		177.28	173.44	168.44	164.06	160.18
Profit before tax (R) - (C)		14.72	18.56	23.56	27.94	31.82
Tax		7.36	9.28	11.78	13.97	15.91
Profit after tax (PAT)		7.36	9.28	11.78	13.97	15.91

Net salvage value of fixed assets		-	-	-	-	31.47
Net salvage value of current assets		-	-	-	-	64
Repayment of term-loans		-	(16)	(16)	(16)	(16)
Retirement of trade creditors		-	-	-	-	(32)
Repayment of short-term borrowing		-	-	-	-	(32)
(i) initial investment						
- equity point of view	(32)					
- long term funds	(96)					
- total funds	(160)					
(ii)Operating cash inflows						
-equity view (PAT+DEP)		26.56	24.60	24.06	23.79	23.77
-long term funds = (Equity view cash flow + Tax Saving on Interest on Long-term loan)		30.40	28.48	26.94	25.71	24.73
-total funds = (Long term fund view cash flow + Tax Saving on Interest on short-term loan)		33.60	31.68	30.14	28.91	27.93
(iii) Terminal cash flows						
-equity view - long term funds -total funds			(16)	(16)	(16)	15.47* 64 95.47

Net cash flows from ---						
-equity view = CF – Loan Repayment		26.56	8.64	8.06	7.79	39.24

*(31.47 – 16= 15.47)

4.6 Techniques of Solvency /Liquidity Analysis

Solvency is the ability to pay off all liabilities and liquidity is the ability to pay off short-term liabilities. Funding agencies give a pointed assessment of this before sanctioning fund to a project.

i. Loan safety ratio

This indicates the relationship between term liabilities and owned funds and helps in assessing the capital gearing. The debt shall include long term loans, debentures, deferred payment preference shares due for redemption between 1 to 3 years. The equity includes ordinary share capital, preference share capital due for redemption after 3 years. Investment subsidy, unsecured loans subordinated to the term loan, internal accruals, non refundable deposits in the case of cooperatives.

ii. Current ratio

Current ratio measure the ratio of Current assets to current liabilities. The ratio indicates the liquidity position of the company. Current assets should be more than current liabilities. The acceptable ratio should be between 1.8 to 2.2, that is a 10% spread around the thumb rule figure of 2. The ratio beyond 2.2 will indicate that either the inventories are stocked unnecessarily or the products produced are not sold. The current ratio will indicate the necessity for proper inventory control.

iii. Debt service coverage ratio (DSCR)

The ratio indicates the capacity of the unit to repay the term loan liabilities and interest thereon. It is important ratio for lending institution as the repayment period has to be suitably fixed based on this ratio. This ratio indicates the cash generation the term liabilities to be paid out of this and balance left for the company's use. Repayment of term loan without generating sufficient cash

will lead to reduction in working in the working capital, tight liquidity position and further deterioration in the working of the unit. The acceptable ratio should not be less than 3. The *formula* calculation of the DSCR is given below.

DSCR= {Profit after tax + Depreciation + Interest on term Loan liabilities)/ (Payment of term loans + interest on loans)

The DSCR should be calculated for each year of operation and also for the entire repayment period as an advance.

iv. Margin of security

The term loans are generally sanctioned against the security of fixed assets. The excess of fixed assets over the term loans provides margin for the term loans.

Margin of security = [Value of fixed assets - Term loans] x 100 / [Value of fixed assets]

4.7 Productivity: Productivity can be known through certain Productivity Ratios. The different Productivity ratios are:

a) Capital employed to Value of output sales
b) Capital employed to Net value added
c) Investment per worker
d) Productivity per worker

4.8 Break Even Point (BEP)

The manufacturing cost consists of two costs viz. fixed costs and variable costs. Certain type costs viz. depreciation, interest on term loan, repair and maintenance, rent and insurance, salaries of administrative staff, administrative expenses etc. have to be incurred by the unit irrespective of the level of operation. This cost will not change with the level of operation and they are called fixed costs. All the other costs viz. cost of raw material, consumables, power, water, stores, packing charges, selling expenses etc., vary with the level of operation and these are called variable cost. The BEP is the level at which the unit should operate to meet the fixed costs. It is level of operation, where there is no profit or loss for the unit. The BEP is calculated using the following formula

BEP in units = Total Fixed Cost / Contribution per unit

BEP in % terms of installed capacity = [BEP in units / Installed capacity in units] x 100

The appraising officer should follow uniform policy to divide the total cost into fixed cost and variable cost as certain cost neither remain fixed nor changed in the same proportion in which the level of production changes.

5. SOCIAL COST BENEFIT ANALYSIS (SCBA)

An Investment decision consists of choosing between two alternative opportunities of investment. A private firm maker an investment after taking into account the conditions of demand and competition, price and cost of its proposed production. But when a government makes a decision about a public works programme like laying a road, building a dam or opening a school or a hospital it uses the social cost benefit criterion to make the decision.

Cost benefit analysis is about choice or to be more correct, about economic choice. In its widest sense, cost-benefit analysis is the basis of the whole process of decision-making under resource constraints. The objective of cost benefit analysis in this wide sense is to secure `value of money' in economic life and this is achieved by simply adding up the costs and benefits of alternative economic choices and selecting the alternative which offers the largest net benefit, i.e., the highest margin of benefit over cost.

i. Differences between Private and Public Investment

Differences exist between Private and Public Investments in their objectives, impact on environment etc.

a) Social Objectives are important in the case of a public investment and not merely the profits of the undertaking. These social objectives may be the (i) increase in aggregate consumption (ii) the achievement of self reliance (iii) redistribution of income (iv) a substantial rate of economic growth, (v) increase in employment (vi) increase in the literacy level, (vii) improvement in knowledge of the society.

   Private objective is to maximize earnings and maximize wealth.

b) The effect of the Project on its environment and on the rest of the economy should be scrutinized and not merely the internal cash flows of the project. When an airport is built, the revenues of the airport are not only important consideration. The improvement of national defense, development of meteorological service in the area and the benefit to Government administration are other important considerations in addition to the general benefits to industry, commerce and society. Similarly if a school/college/university comes up in a neighbourhood, the benefits therefrom are immense in terms of rise in literacy level, rise in people's stock of knowledge, rise in R&D capabilities of people and so on. These are difficult to be quantified.

The true resource effects (the real costs and benefits) of the project should be discovered and not merely its money costs and benefits. There are secondary or indirect benefits and intangible which should also be taken into account. A new road may lead to a reduction of accidents, dislocation of residents' right of way, disruption of the travel patterns of the people in the neighbouring areas, more pollution and risk in the neighbourhood and increased congestion in alternative roads, etc., which are all to be added to the money costs and benefits.

The concept in cost benefit analysis which distinguishes it from all other techniques of investment appraisal is described by Prest and Turvey as taking `a wide view'; basically this means two things:

(i) First, it recognizes the general point that a decision taken in one area of the public sector will affect many other areas (external effects of spillover effects). For instance decisions taken on the sitting of a new local authority housing development will clearly have implications for the provision of roads, sanitation, schools, community facilities, etc.,

(ii) The distinction between Private and Social Cost is the very core of cost-benefit analysis. The example of the factory chimney has been widely quoted but illustrates the point well enough. A private industrialist building a new factory is only concerned with the financial cost he incurs and the revenue produced by selling the manufactured goods. He is not concerned with the fact that the smoke from his chimneys imposes costs on nearly residents, he does not have to bear these costs. Yet such costs are real enough. They may take the form of higher laundry bills, or even hospital bills because the smoke could have serious long-term effects on

health. So long as the industrialist has an objective expressed in terms of private profit and loss he can legitimately ignore these external costs. However, the goal of decision making in the public sector is expressed not in terms of private profit or loss, but rather in terms of social (benefits) profit or loss i.e., fear of serious environmental side effects or investment spillovers.

ii. Identification of Costs and Benefits

The first task in a cost-benefit analysis is to identify all the relevant costs and benefits of the investment project under consideration. Many alternative classification of costs and benefits have been suggested to assist this exercise: `Private', `social', `secondary', `indirect' are all objectives which have been used to describe different types of cost and benefit. However, it now seems to be generally accepted that only two types of distinction need to be made: (a) between efficiency and non-efficiency benefits and costs, and (b) between efficiency benefits and costs measured in terms of Gross National Product and other efficiency effects. Cost benefit analysis is primarily concerned with the efficiency effects of public investment projects. It is of little relevance in evaluating other effects e.g., the equity benefits of income distribution policies, although it can help by identifying the sectors in the community which are affected by a project. Within the category of efficiency benefits and costs, it is possible to discern two basic types - those who impinge directly on (Gross National Product) G.N.P. (though not always) measured in terms of market price, and those which cannot be related to G.N.P. e.g., a loss of visual amenity. The identification of all relevant effects may be an extraordinarily complex process, because the effects of a project in a major policy area may well be infinite. In practical terms, it is possible to identify all the relevant costs and benefits, but an attempt will usually be made to build a model which includes all of what are considered to be the major effects.

The first problem in a successful formulation of a cost-benefit. Appraisal is to identify the `cut-off' points in the analysis. For instance, the geographical cut-off is like to be a fundamental issue when considering local authority projects. Geographical cut-off points should be specified in the analysis (possibly by the decision-makers themselves), in order to decide whether costs and benefits of this type should be included. Any type of cut-off relates to the

range of different sectors of the community for which costs and benefits should be included. Although it is important to avoid the omission of any important class of costs or benefits, it is equally important to avoid double counting e.g., Irrigation Project will increase (the value of crops grown and market value of land).

iii. Measurement of Benefits and Costs

Having enumerated all the relevant costs and benefits the next problem is how to measure them. This appears to be the limiting problem so far as the development of cost-benefit analysis is considered. The calculation of private profit is a relatively straightforward matter because costs and benefits are simply derived from market prices (where `benefit' is defined as the maximum amount and individual would be willing to pay for a good). However, many of the goods and services produced in the public sector are not period in the market. Therefore, when the physical outputs of a public project have been estimated, it will be necessary to assign monetary values to many of them on the basis of other information.

The correct measure of project benefits is, therefore, the sum of market value and consumer surplus, but market price may often be used as a first approximation. Where there is no organized market a shadow price is followed.

The whole question of measurement of "intangible" costs and benefits is one which has dominated the analytical development of cost-benefit analysis. Intangibles, a cost or benefit can be measured or qualified in physical terms. Many cost-benefit studies use money cost, opportunity cost etc.

The final stage in a cost-benefit analysis is to collate all the relevant information in an institution which is useful in decision-making. Assuming that all the relevant costs and benefits of a number of alternative projects have been identified, measured in monetary terms, discounted for the time and adjusted for uncertainty use the information available to rank the alternatives in terms on `social profitability' Criterion. The project which offers the highest net present value of benefits (i.e. present value of benefits minus present value of costs) should be ranked highest and the others ranked accordingly. When benefit-cost is expressed in the form of a ratio, a ratio higher than unity indicates a relatively attractive investment and less than unity an unattractive proposition.

iv. An example of money costs and real costs and benefits

A Flood Control Project

Costs: **Money costs** of initial works like dams, bunds and canals, weirs, etc., Repairs and Maintenance

Land acquisition and compensation paid for submerged land

Social cost is the loss of employment because the land has been submerged.

Benefits: Losses averted to Property, crops and cattle not washed away.

Avoidance of death by drowning.

Avoidance of temporary Costs:

- evacuation of victims
- emergency sand-bag work
- feeding the marooned
- sanitation breakdown
- epidemics control

Flooded land forced for cultivation

Increase in employment therefrom

v. Two Popular Methods of Project Evaluation

Mention should be made here of two important methods of appraising public investment now in the field. They are the L & M method and UNIDO method. L & M method is that developed by Ian Little and James Mirrlees under the auspices of O.E.C.D. (Manual of Industrial) Project Analysis in developing countries Vol. II (Social cost-benefit analysis, 1968). The UNIDO method is based on writings of Stephen Marglin, A.K.Sen, Thomas Weiskoof and others. (UNIDO: Guidelines for Project Evaluation, 1972).

vi. Uses of the SCB Analysis

Social Cost benefit (SCB) analysis has been widely used in many countries including India in many fields of Public Investment including: Land reclamation, formation of towns, health and ***education programmes***, research and development, defense projects roads, railways, canals, airports and other transport projects, water projects etc for the following reasons.

i) The growth of investment projects with huge cost and long-term effect on prices and outputs of other goods and on the living conditions of many persons.
ii) The rapid growth of the public sector.
iii) The development of techniques like operations research and systems analysis which have made the work easy.
iv) Resource constraints to the individuals as well as to Government.

vii. Limitations of Social Cost-Benefit Analysis

The nature of social benefits and costs are such that there cannot be any standard method or technique applicable to all types of investment projects. A bridge, a road, a housing colony, or an industrial project will each require a different approach while identifying and measuring its social benefits and costs. For one thing, the nature of inputs and outputs of projects involving very large investment and their impact on the ecology and people of the particular region and the country as a whole - are bound to differ from case to case.

At another level too the problems of quantification and measurement of social costs and benefits are formidable. This is because many of these costs and benefits are intangibles and their evaluation in terms of money is bound to be subjective. Even with honesty of purpose, assessment of social good and social evil is likely to be tainted by the analysis' own ideas and subjective preferences and the resulting decision may not serve the socio-economic goals which might have been initially formulated.

viii. Social Cost – Benefit analysis– National profitability

The national profitability of a project is measured by assessing the extent to which it makes a net contribution to meeting the socio-economic objectives of development.

National profitability analysis essentially involves a socio economic cost-benefit analysis. Every project entails some costs to the nation and produces certain benefits. There are both direct and indirect costs and benefits, although the distinction between 'direct' and 'indirect* is not sometimes clear out. An educational project, such as establishing a university has social cost and social benefit. Social costs are the economic cost of resource committed or their opportunity and social burdens that get crated in the process. Social benefits are the economic benefits and other benefits that accrue to the society.

180

Calculation of national profitability of a project is based on its net contribution to the socio-economic objectives of the development policy of the nation. Therefore, in the Indian context, the social and economic viability of a project will be judged on the basis of its net contribution to:

i) Aggregate consumption and economic growth
ii) Generation of employment
iii) Income distribution
iv) Foreign exchange earnings/savings
v) Self-reliance
vi) Development of backward regions
vii) vii. Development of small-scale and ancillary industries ,
viii) Backward and forward linkages and development of other industries/ sectors
ix) Development of infrastructure
x) Development/Improvement and transfer to technology
xi) Improvement of quality and productivity
xii) Improvement in the quality of life and national well-being

Assessment of national profitability is very complicated. It is not possible to identify all the indirect costs and benefits of some projects. Further, even in cases of many identifiable variables, it is not possible to accurately estimate the indirect costs and the value of the indirect benefits.

It is also difficult to estimate the real cost of direct inputs and the real value of the output Another important problems is the determination of the social rate of discounting.

ix. Opportunity cost

In the social cost-benefit analysis the relevant cost is the opportunity cost. The opportunity cost is the (i.e. the benefit) of the best alternative foregone due to a particular course of action.

It is implied from the above definition of opportunity cost that there is no opportunity cost when there is no alternative. For example, the opportunity cost of self-employment is the salary for the best job he could have obtained. But if he does not have any job opportunity other than the self-employment, there is no opportunity cost for the self-employment.

Resources have opportunity costs when they have alternative uses. When there is scarcity of resources, decisions about resources allocation should be base on a careful assessment of the opportunity costs of the alternatives.

To illustrate, assume that financial resources are scarce and the total resources available with a financial institution for lending is Rs. 10 lakhs and there are three applicants seeking finance viz., Project A requiring assistance of Rs. 10 lakhs , Project B requiring Rs. 6 lakhs and Project C requiring Rs. 4 lakhs. The opportunity cost of project A is the benefit foregone if project B and C are not taken up. Even if all the projects are profitable and feasible, if the net national benefits from A are higher than the aggregate net benefits from B and C, project A should be preferred according to the opportunity cost principle.

In the opportunity cost analysis pertaining to the national profitability analysis it is not the commercial profitability but the net contribution to the national objectives that is considered. Consider, for example, the situation of a commercial bank having to consider applications for loan by two projects - a textile retail shop in an existing commercial areas in a city and an agricultural development scheme - and that the loanable funds with the bank is sufficient only finance any one of these two competing projects.

Assume, further, that the commercial profitability of the textile shop is relatively high and that of the agricultural project is low but it will increase the output of some important agricultural commodity. In this situation the lending institution should prefer the agricultural project because though it is commercially less viable than the textile shop, it will make a higher contribution to the national output. Even if the proposed textile shop is not opened, the total textile output or sale will not be affected but if the agricultural project is not assisted, it will adversely affect the total output. It clearly shows that in the national profitability analysis, application of the opportunity cost principle is very essential.

The opportunity cost principle assumes more importance in economics characterized by scarcity of resources. When cement and steel are in short supply, the opportunity cost of posh cinema theater may be a hospital or school building and the opportunity cost of a number of posh buildings may be can irrigation project, power project, or a transport infrastructure project.

x. Shadow prices

We have stated earlier that in the social cost benefit analysis or in the national profitability analysis, the prices of inputs and outputs of the project should be suitably corrected to reflect the real cost if the market prices are characterized by distortions of any type. Shadow price, also known as accounting price, refers to such adjusted price of the input/output so as to reflect its real cost of value.

For example, if the price charged for electricity supplied to an industrial unit in Rs. 2 per unit when the cost of production of electricity is Rs. 3, the price of electricity is to be considered in the commercial profitability analysis is Rs 2 per unit, but in the national profitability analysis the relevant cost of electricity is Rs 3 per unit which is the real cost of production.

To take another example, suppose that the cost of imported petrol is Rs.38 per litre but the selling price in the domestic market is Rs.47 per litre, with the tax accounting for the difference. The shadow price of imported petrol would, therefore, be Rs. 38 per litre because the differential component of Rs. 9 of the market price of Rs.47 represents a mere transfer of income from one sector to another sector within the economy and it does not represent a resource cost or sacrifice to the nation.

In short, the accounting price of an input, such as capital, labour or foreign exchange represents its opportunity cost or the loss to the economy that would result from a reduction in its supply by one unit. A factor that is expected to be in short supply should have an accounting price higher than its market price, while one that is surplus should have a valuation that is lower than its market price.

Depending on the value judgment of decision making authority, the final decision could be taken.

The focuses of the SCBA are to ensure that the project:

- Contributes effectively to GDP of an economy;
- Aids in economic development
- Justifies the utilization of economy's scarce of growth;
- Maintains and protects environment from pollution;
- Educates new lines of functioning that are simple and cost effective;

- Benefits the rural poor and reduce regional unbalances;
- Justifies the risks undertaken to implement and the sacrifices made in the process.

Therefore, it is important to identify the major economic, environmental, social and other factors a project may influence directly or indirectly. For instance, introducing a coal-fired power plant in a location previously supplied with power over long transmission lines at great cost would introduce economic benefits in terms of lower power costs, higher supply reliability and local employment at the power plant and support activities. Similarly, economic costs might include the use of local land for use of the power plant and coal handling or storage activities, air pollution from both the plant and coal handling, ground water and soil pollution from coal washing and run-off, temperature (heat) pollution from heat rejection to cooling water, congestion of roads and or rail corridors, reduction of investment capital for other projects, commitment of local consumption, and various other indirect costs. Some of the local costs are usually hidden under various concessions given to public development projects, such as capital generation by use of tax-free bonds, use of public land, subsidizing local development constructions, etc.

xi. Project Appraisal in Indian scenario

The project appraisal division (PAD) of the Planning Commission follows a qualified version of Little-Mirrlees approach of projects appraisal to sit through the social-cost benefit analysis. Therefore, the assumptions that are considered in the L-M approach stand valid even for the Indian conditions. In addition to the above, the PAD grouped the projects of national importance into three in order to safeguard from the ever changing tariff policies and eliminate trade-offs between growth and equity. These groups are:

- capital intensive industrial projects;
- infrastructural investments;
- agricultural and rural development projects.

The capital intensive industrial projects are appraised and evaluated on the basis of 'efficiency' criteria. The efficiency criteria bases its arguments on Economic Rate of Return (ERR) of a project This approach is generally followed by all leading development financial institutions of the country such as 1CICI, IFCI, IDBI and other SFIs.

The infrastructural investments are appraised based on the net benefits accrued to a country through the project. The appraisal division will visualize the economic situation in the presence or absence of the project and judge the balance of payments of the country. Therefore, here the shadow prices will be of great concern.

Agricultural and rural development projects bases their arguments on the criteria of shadow wage rate and social protection rate. The wage rate is determined by considering the world prices of labour and the opportunity costs will be considered to analyze the situation of the economic costs and benefits of such developmental undertakings.

xii. Three important measures: Let us briefly present three important measures which are widely applicable to projects of national importance.

a. Economic Rate of Return (ERR):

In order to compute the ERR, the world prices are considered instead of domestic market prices will be considered with C.I.F prices for inputs and F.O.B prices for traded goods. For able goods where the international prices are not available and for non-tradable goods, social conversion factor (SCF) is essential to convert actual rupee value into the social cost or benefit derived.

b. Shadow exchange rate (SER)

The shadow exchange rate can be defined as "that rate of exchange which accurately reflects the consumption worth of an extra unit of foreign exchange in terms of the domestic currency". Say if an extra US$ is earned by the public project, what domestic consumption value would it buy? If it can buy Rs 40 worth of goods, while official exchange rate is Rs 45, then, SER = Rs 40 .

c. Effective Rate of Protection (ERP)

ERP is a simple measurement that attempts to determine the true or effective magnitude of the tariff on inputs of a public project. Practically the normal rate of tariff may be 25% and if majority of output from public project is contributed with the help of imports, the domestic resources are being protected at a rate much higher than 25%. According to Bhagawati and Desai, the ERP can be defined as "the incremental value added, which is the difference between value added at domestic prices and value added at import prices".

6. FEASIBILITY REPORT

The feasibility report of a project is prepared during the definition phase of a project. It lies in between Project formulation stage and Project appraisal & sanction stage. It is prepared to present an in-depth techno-commercial-economic analysis on the project idea for consideration of the financial institutions and other authorities empowered to take the investment decision.

In the broadest sense, every rational decision to make new investment is proceeded by an investigation of the feasibility of the project, whether or not this is carried out in a formal manner. The larger the project and greater the investment, the more formalized the investigation. Assurance is needed that the market exists or can be developed, that raw materials can be obtained, that sufficient labour supply is available, that local services vital to the project are at hand, and that the overall costs for plant equipment, technology needed is available. When the project is small, the study format may be quite informal, perhaps there will be no formal study at all and little accumulation of data. Nevertheless, the feasibility calculations will have to be computed and evaluated at least in an informal manner before the ultimate step of actual investment is taken.

6.1. Need for Feasibility Studies

A company is incorporated for the purpose of setting up a project. The promoters obviously have, to start with, some broad idea about the proposed industrial activity. They make mental picture as to how the idea, when translated into reality would result in a profitable project, given the/demand supply pattern, probable cost of production etc. It is quite likely that the originators get attracted by the favourable aspects of the project known to them, while they may have overlooked the dark side -of the picture, which can only be revealed by a detailed objective study. Too many projects have floundered, at considerable loss to the investors and indeed to the national economy through waste of scarce resources, because the investment decisions were taken without objective and in depth techno-economic feasibility studies. The need for such careful studies is further underscored on the following counts:

i) In modern times, business operations are complex, requiring carefully prepared plans.

ii) The shareholders, creditors, term leaders etc. insist on as complete an analysis of the scheme as possible without their co-operation, it would not be possible to translate the idea into action.

iii) This feasibility study helps the promoter to make the investment decisions correctly and to obtain funds without much difficulties.

iv) It allows the promoters to anticipate the problems likely to be encountered in the execution of the project and phases them in a better position to answer the queries that may be raised by the financial institutions and others who would have to be involved in the project.

6.2. Components of Feasibility Study

Project feasibility study comprises of market analysis, technical analysis, financial analysis, and social profitability analysis. The analysis is mainly interested only in the commercial profitability and thus examining only the market, technical and financial aspects of the project. But, generally the gamut of feasibility of a project covers the following areas.

i. Commercial and economic feasibility
ii. Technical feasibility
iii. Financial feasibility
iv. Managerial feasibility
v. Social feasibility or acceptability

These areas are briefly described below.

i. Commercial and Economic feasibility

The *commercial feasibility* of a project involves a study of the proposed arrangements for the purchase of raw materials and sale of finished products etc. This study comprises the following two aspects.

- Arriving at the physical requirement of production input such as raw materials, power, labour etc., at various level of output and converting them into cost. In other words, deciding costing pattern.
- Matching costs with revenues with a view to estimating the profitability of the project and the break-even point. The possibility ultimately decides whether the project will be a feasible proposition.

Economic feasibility aspects of a project relate to the earning capacity of the project. Earnings of the project depends on the volume of sales. It takes into consideration the following important indicators.

- Present demand of the goods produced through the project
- Future demand: a projection may be made about the future demand. The period normally depends upon the scale of investment.
- Determining the extent of supply to meet the expected demand and arriving at the gap.
- Deciding in what way the project under consideration will have a reasonable chance to share the market.
- Anticipated rate of return on investment. If it is positive the project justifies the economic norm In the relationship between cost and demand.

Future demand can be estimated after taking into consideration the potentialities of the domestic and export markets; the changes in the income and prices, the multiple use of the product, the probable expansion of industries and the growth of new industries. The share of the proposed project in the market could be identified by considering the factors affecting the supply position such as competitive position of the unit, existing and potential competitors, the extent of capacity utilization, unit's costs advantages and disadvantages, structural changes and technological innovations bringing substitute into the market.

ii. Technical feasibility

The technical analysis of a project feasibility study serves to establish whether or not the project is technically feasible and it also provides a basis for cost estimating. The examination of this aspect requires a thorough assessment of the various requirements of the actual production process and includes a detailed estimate of the goods and services needed for the project. So, the feasibility report should give a description of the project in terms of technology to be used, requirement of equipment, labour and other inputs. Location of the project should be given special attention in relevance to technical feasibility. Another important feature of technical feasibility relates the types of technology to be adopted for the project. The exercise of technical feasibility is not done in isolation. The scheme has also to be viewed from economic considerations; otherwise, it may not be a practical proportion however sound technically it may be.

The promoters of the project can approach the problem of preparation of technical feasibility studies in the following order:

- Undertaking a preliminary study of technical requirements to have a quick evaluation.
- If preliminary investigation indicate favourable prospects working out further details of the project. The exercise begins with engineering and technical specifications and covers the requirements of the proposed project as to quality, quantity and specification type of components of plant & machinery, accessories, raw materials, labour, fuel, power, water, effluent disposal transportation etc.

Thus, the technical feasibility analysis is an attempt to study the project basically from a technocrat's angle. The main aspects to be considered under this study are: technology of the project, size of the plant, location of the project, pollution caused by the project production capacity of the project, strength of the project. Emergency or stand-by facilities required by the project sophistication such as automation, mechanical handling etc. required collaboration agreements, production inputs and implementation of the project.

iii. Financial feasibility

The main objective of this feasibility study is to assess the financial viability of the project. Here, the main emphasis is in the preparation of financial statement, so that the project can be evaluated in terms of various measures of commercial profitability and the magnitude of financing required can be determined. The decision about the financial feasibility of a project should be arrived at based on the following consideration:

- For existing companies, audited financial statements such as balance sheets, income statements and cash flow statements.
- For projects that involve new companies, statements of total project cost, initial capital requirements, and cash flow relative to the projective timetable.
- Financial projections for future time periods, including income statements, cash flows and balance sheets.
- Supporting schedules for financial projections stating assumptions used as to collection period of sales, inventory levels, payment period of

purchases and expenses and elements of production cost, selling administrative and financial expenses.

- Financial analysis showing return on investment return on equity, break-even volume and price analysis.
- If necessary sensitivity analysis to identify items that have a large impact on profitability or possibly a risk analysis,

v. Managerial feasibility

The success or failure of a project largely depends upon the ability of the project holder to manage the project. Project is a bundle of activities and each activity has its own role. For the success of a project, a project holder has to co-ordinate all the activities in such a way that the additive impact of different inputs can produce the desired result. The ability to manage and organize all such inter related activities come within the concept of management. If the person in-charge of the project, has the ability, has the ability to manage all such activities, the desired result can be anticipated.

There are three ways to measure the managerial efficiency.

a. Heredity skill

b. Skill acquired through education and training.

c. Skill acquired in course of work.

vi. SOCIAL FEASIBILITY

A project may cross all the above hurdles and found very suitable, but it will still lose its entire creditability, if it has no social acceptance. A project should avoid all social conflicts which will stand on the successful implementation of the project.

6.3 Format of Feasibility Report

In a nut shell, the feasibility report should highlight the desirability of the project on the above 5 testing stones before it can be declared as complete. Only after judging through these indicators a project can be declared as viable and can be submitted for finance or any other assistance from any institutions.

A sketch of feasibility report of project is given below:

- Introduction
- Summary and Recommendations
- Product Capacity, Chemistry of the product, specifications, properties, application and uses.
- Market potential
- Process and know-how
- Plant and machinery
- Location of the unit
- Plot plan and building
- Raw materials availability
- Utilities, requirements
- Effluents treatment
- Personnel requirement
- Capital cost
- Working capital
- Mode of finance
- Manufacturing cost
- Financial analysis
- Implementation schedule

6.4 Check List for Feasibility Report

The following key elements must be presented in the feasibility report.

- Examination of public policy with respect to the industry project
- Broad specification of outputs and alternative techniques of production.
- Listing and description of alternative locations
- Preliminary estimates of sales revenue, capital costs and operating costs of different alternatives.
- Preliminary analysis of-profitability for different alternatives.
- Marketing analysis
- Specification of product pattern and product price
- Raw material investigation and specification of sources of raw material supply.
- Estimation of material energy, flow balance and input prices.

- Listing of major equipment by type, size and cost.
- Listing of auxiliary equipment by type, size and cost.
- Specification of sources of supply for equipment and process know-how.
- Specification of site and completion of necessary investigation.
- Listing of buildings, structures and yard facilities by type size and cost.
- Specification of supply sources connection costs and other costs for transportation services, water supply and power
- Preparation of layout.
- Specification of skill-wise labour requirements and labour costs.
- Estimation of working capital requirements
- Phasing of activities, and expenditure during construction
- Analysis of profitability
- Determination of measures of combating environmental problems
- State the preparedness to implement the project rapidly.

We may sum up that a feasibility report helps in defining and analyzing the alternative approaches to production processes and outcomes. It focuses attention on the material inputs and various other techno-economic variables. It describes the optimization process, justifies the assumptions and hypothesis set thereby selecting the better alternative solutions and defines the clear boundaries of a project viability.

Questions:

1. What is the required information for the proper project appraisal?
2. Describe the different stages in the project appraisal process.
3. Write "Significance of appraising the market for an industrial project and how it can be made?
4. Explain the different tools of commercial appraisal of a project.
5. What do you mean by SCBA? How it can be made?
6. What are Economic Rate of Return and Effective Rate of Protection and how it could be computed?
7. Explain the UNIDO guidelines for SCB Analysis.
8. What is financial appraisal? What aspects are studied over there?

9. Explain the techniques of financial appraisal and their relevance.
10. What are the issues relevant to project appraisal?
11. What do you mean by feasibility study? Explain its significance in project formulation?
12. Explain the different components of feasibility study.
13. Three projects involve a total outlay of $2000,000. Investment in any one project can be any amount, subject to the total outlay. The estimated return from the projects are 14%, 16% and 20%. The std. deviation of returns are 5%, 10% and 10%. The correlation coefficients are 1&2: 0.4, 2&3: 0.6 and 1&3: 0.2. A portfolio with weight 0.2, 0.3 and 0.5 for the three projects, respectively, is constructed. Find the portfolio return and risk.
14. A company brought a machine 2 years earlier at a cost of $ 84,000 and estimated its useful life as 12 years in all. Its current market price is $ 45,000. The management considers replacing this machine with a new one, life 10 years, price $ 120,000. The new machine can produce 15 units more per hour. The annual operating hours are 1,000 both for new and old machines. Selling price per unit is $ 4. The new machine will involve addl. material cost $ 8,000 and labour $ 6,000 p.a. But savings in cost of consumable stores of $ 1,000 and repairs by $ 4,000 p.a. will result. The corporate tax rate is 30%. Advice on the replacement assuming additional working capital of $ 20,000 introduced now, can be redeemed at 10 years later, cost of capital as 10% and SLM of depreciation, using NPV method.
15. A firm is currently using a machine purchased two years ago for $ 1400,000. It has further 5 years of life. It is considering replacing of the machine with a new one, which will cost $ 2800,000. Cost of installation $ 200.000. Increase in working capital is $ 400,000. The profits before tax and depreciation are as follows for the two machines.

Year	1	2	3	4	5
Current Machine ($.)	500,000	700,000	800,000	700,000	600,000
New Machine ($.)	1200,000	1400,000	1600,000	1400,000	2000,000

The firm adopts fixed installment method of depreciation. Tax rate is 40% and capital gain tax is 10% on inflation un-adjusted capital gain.

Is it desirable to replace the current machine by the new one, taking the resale value of old machine at $ 1600,000 at present and using, PBP, ARR, NPV and IRR? (For NPV method take 10% as discount rate, for ARR method cutoff rate is 15% and for PBP method cutoff period is 4 years).

* * *

UNIT – 4

PROJ ECT IMPLEMENTATION

Syllabus Covered: Issues relating to Project Implementation- Project Net-working- Project Organization- Project Contracting- Project Personnel
OBJECTIVES
1. To present the concept of project design 2. To study issues relating to project implementation 3. To present the use and technique of net-=working 4. To discuss the concept and types of project organization 5. To deliberate on the issues and significance of project related contracts 6. To understand the importance of various classes of project personnel

1. PROJECT DESIGN

Project design is the first stage in the execution of the project. Project design is concerned with developing project scheduling techniques and also drawing the schedule for implementation of the project. This is more or less a time frame for each phase in the project development. It includes major items of project implementation such as finding of location, construction of buildings, procuring plant and machinery and finally executing the production programme.

Project design along with network analysis helps to develop work plan of the project and present it in the form of diagrams representing duration of time for each work and adjustment of the time schedule framed with reference to the problems that usually arise in the project execution. Project design is useful to the entrepreneurs in the following ways:

i) It gives a comprehensive idea about the entire project - described in every phase along with the time schedule within which it has to be completed.

ii) It is a diagrammatic representation of work plan devised to execute the project, after adjusting the usual delays that may arise in the implementation of the project.

iii) The various constituent activities of the project are narrated in sequence to highlight the various phases of the project.

iv) It defines the individual activities which go into the corpus of the project and their interrelationship with each other.

v) It enables to identify the flow of events, that is which must take place for the successful completion of the project.

vi) It helps entrepreneurs in coordinating project activities.

vii) It serves as an effective tool of planning and implementation of a project.

viii) It helps managers to plan the project economically.

With the advent of the computer and large-scale introduction of computer based planning and control in Indian public sector units, network analysis can considerably enhance managerial effectiveness in the context of any time bound action programmes. Petty defaults have caused big diseconomies in the public sector enterprises in this country. Computer-based network analysis can handle these problems economically and efficiently. The binding condition is, however, that management is serious in effecting economies in different areas of activities; and activities and events are closely watched for initiating corrective action in proper time.

The main task of a project manager is to design systems and manage through them. A business system refers to the total picture of men, machine, materials and paperwork involved in the implementation of any phase of a project. System has a planned sequence of operations for carrying out a recurring work involved in a system with family and consistently which is called a procedure.

The first step in system design for project management is to conceive the total physical system and its natural modules. In the next step, involves drawing the connection between these modules.. Finally, a control system using information as the media has to be developed for self control as well as forced control of the total project. Project management system is mainly constituted by project work system and project control system.

If the project is organized on the lines of process units or technological systems, coordination will be extremely simplified and cooperation would be almost assured. Therefore, better results can be obtained if the design of work is

systematized. The process of systematization starts with the development of a work breakdown structure.

1.1. Work Breakdown Structure (WBS)

Work breakdown structure, WBS in short, is a technique which breaks down a work into its components and at the same time establishes the connections between the components on the lines of a family tree.

The work breakdown structure represents a systematic and logical breakdown of the project into its component parts. It is constructed by dividing the project into its major parts, with each of these being further divided into subparts. This is continued till a breakdown is done in terms of manageable units of work for which responsibility can be defined. Thus the work breakdown structure helps in:

- Effective planning by dividing the work into manageable elements which can be planned, budgeted, and controlled.
- Assignment of responsibility for work elements to project personnel and outside agencies.
- Development of control and information system.

1.2. Work Breakdown Structure and Project organization

The project organization represents formally 'how the project personnel and outside agencies are going to work'. The work breakdown structure defines what work is to be done by whom in a detailed manner. To assign responsibility for the tasks to be done, the work breakdown structure has to be integrated with the project organization structure.

Work can also be broken down using a function-oriented approach. This is normally the approach used by contractors for distributing work in-house which is normally organized on functional lines. Here again, the breakdown up to a certain level is natural, thereafter it assumes a certain pattern of grouping which can change with the designer of the WBS.

Work breakdown through the hardware approach is, therefore, the only natural and permanent way of breaking work. Added to this, using a rational codification number it is possible to establish the linkage of the hardware

element with software and agencies. Performance target, schedule, budget and accountability can similarly be fixed for any hardware element. Thus, hardware-oriented work breakdown structure provides the basic framework for project work system design.

1.3. Project Execution Plan (PEP)

Project execution plan (PEP) refers to that exercise of matching the project hardware and software with the executing agencies so that a viable work system emerges.

Project execution plan, in fact, includes four sub-plans. These are:

i. Contracting plan
ii. Work packaging plan
iii. Organization plan
iv. Systems and procedure plan

Project execution plan is a strategic plan - it does not deal with the operational details of building a project. The operational details are covered in a network plan which is developed later after the project execution plan is approved by the owner's plan for project execution and, therefore, it must form the basis for development of all operational plans including network plans.

1.4 Contracting Plan

This is the first step in the preparation of a project execution plan. Owners invariably need some agencies with whom they can share responsibilities. In the interest of developing self-regulating systems it would be necessary to contract out those areas where the owner's company does not have inherent competence.

Which type of contract to choose, which type of reimbursement to make, what conditions of contracts to stipulate, and what payment terms to offer, are all issues that must be examined during this phase of the project. Contract planning would involve examination of a number of alternatives since there are so many possible arrangements in terms of sharing of responsibilities, types of reimbursements and general conditions of contract.

1.5 Work Packing Plan

Work packing plan will be the next important step in the preparation of the project execution plan. A work package in a project is the smallest division

of work where it still retains the characteristics of a project. Thus when a project is progressively divided into systems and the systems into subsystems, a stage is ultimately reached where further division into components will strip it of its multi-disciplinary character - the work at that stage can be considered to be a work package. Work package planning refers to the identification of these packages, grouping them or keeping them as they are, in order to form viable contracts.

Work packaging enables better organization and management of projects. A work package or several work packages may be assigned to one individual who could serve as a mini project manager. This enables projectization of the entire project execution effort which, in turn, ensures the closest possible adherence to time, cost and technical performance targets.

Work packaging can also ensure that all agencies in a project think and channel their effort in one direction, i.e. towards the completion of the packages only. Thus, design engineers, procurement engineers and construction engineers will then give priority to their work in relation to a work package and not according to functional convenience. Fulfillment of the requirements of a work package will alone be considered an achievement and not the mere volume of work completed. This will lead to a well-coordinated completion of the project.

Thus, the contracting plan and work packaging plan together produce a list of contracts with the scope of work defined ^n terms of self-contained work packages.

1.6. Organization Plan

Having decided the number of contracts and their scope, the owner is now in a position to set his own house in order. The owner can deliberate on the form of organization to be adopted so that the interest of the project is best served.

Several standard organizational arrangements are possible, ranging from pure functional organization to pure projectized organization and an owner has to choose his own arrangement depending on the project size, location, complexity, work packages, type and number of contracts. It should be however, noted, that an organization can become more self-regulating if it is on taskforce or projectized. The participants in such cases fully identify themselves with the project objectives and would regulate their behaviour on their own, as the situation may demand.

1.7 Systems and Procedure Plan

The last section of the project execution plan deals with systems and procedure. A heavy emphasis has to be placed on routine systems and procedure so that no intervention is required in the day-to-day operation of a system. There are at least eight routine sub-systems of project management for which appropriate procedures can be conceived right at the start of the project implementation.

These eight sub-systems are:

1. Contract management
2. Configuration management
3. Time management
4. Cost management
5. Fund management
6. Materials management
7. Communications management

While the routine systems and procedure for each company will be different, in most of the cases the difference may not be very significant. It is quite possible to examine the systems and procedure of one project and adapt it after making minor modifications.

1.8 Project Procedure Manual

A project procedure manual is to be prepared in such a way that the interacting agencies are able to see their roles and mutual relationships in pursuance of the common goal.

Preparation of a project procedure manual should start with each project management sub system. A system decomposition has to be carried out on each sub-system to identify the need for procedure write-ups. While carrying out decomposition the question to be asked is what the system must achieve and what contributes to the effective functioning of each of the elements. By asking this question at successive levels it is possible to develop a complete picture about the system.

The procedure to be developed for making the system self-regulative would not, however, come out automatically from this analysis. The decision has to be empirical, and in some cases intuitive.

1.9. Project Diary

In order to ensure effectiveness, project manager or executives have to maintain a record date-wise of the points discussed and decision taken which are required to be followed for implementation. This is what is known as project diary.

A project manager would be holding a number of meetings some with vendors, some with contractors some with his own staff and others may be with various outsiders. Many decisions are taken in these meetings and many commitments are made. Also, a lot of brain-work is done during these meetings. Information derived on these occasions, decisions arrived have to be properly recorded in the project diary. This will go on record to enable their communication and implementation. Information noted in the diary help to justify the decisions at later date. This record may also be used to defend against non-admissible claims and litigations. This diary helps in preparing a follow-up register also. The follow-up register will contain all pending work with dates committed against each.

Maintaining diary helps the person to get relieved of the burden of carrying everything in their head. It could boost up one's memory thereby helps to avoid the problems of unattended work due to lack of memory.

Hence, all project executives has been urged to maintain project diaries.

1.10 Project Execution System

Once these systems and procedures have been developed for the project, it is the duty of the project administrator to set for smooth take off. It requires proper project execution system which should be more concerned about external intervention for survival than on its internal self regulating capability.

The external intervention will be of the following forms:

- Project direction
- Project co-ordination
- Project communication
- Project organization
- Project control

These terms are often construed as actions for getting results. Too often the terms are used interchangeably to mean management. Therefore, for the

successful execution and administration of project requires direction, organization, co-ordination, communication and control all at the same time but in varying proportion. We shall discuss the nature of significance of project direction, communication, co-ordination in this lesson.

Project direction: Project direction refers to the use of authority to channelise the activities of the project on desired lines. During the initiation of start-up period of the project this direction shall be provided by the project manager. But once the project enters the production period direction will be exercised by other prepare a follow-up register also. The follow-up register will contain all pending work with dates committed against each. Project start-up, design reviews, purchase order and work orders are one-time directions. But a project will require when unforeseen events occur, directions from above. In either case, a decision has to be made as to what should be done and the same should be authorized for implementation. Thus, decision making and direction are part of every-day function of any manager.

Routine directions involve five steps:

i) Understanding the decision environment
ii) Establishing the decision alternatives
iii) Evaluation of the alternatives and selection of a course of action
iv) Communicating the decision to the individual or agency who is to implement the decision
v) Checking up if the decision is working so that the decision could be steered by the consequences. This refers to the feed back system discussed by us earlier.

Communications in a project: For on-going directions a two-way communications systems is essential. For that matter, the entire process of direction, co-ordination and control in a project revolves all round communication.

It is often concluded that projects are run by communications. In fact, according to Peter F Drucker, 63% of management problems are caused in whole or in part by faulty management communications.

Communication has two dimensions physical and mental, passing a memo, drawing, data, instruction, information, etc. are the physical aspects of

communication; understanding the same in the light of role expectation, empathy, preconceived notions, language barriers, listening skills etc., are the mental aspects of communication. While physical aspects of communication can be easily achieved, the mental aspects often present barriers to communication. Perfect communication requires a conscious and determined effort.

Allocative communication in a project would require a communication oriented action plan. The actions that may be taken in this regard are as below:

a) Organization of work, people and work place with communication orientation
b) Selection and installation of appropriate communication devices
c) Project review and co-ordination meetings at predetermined frequency
d) Predetermined document distribution matrix.
e) Establishing healthy attitude towards communication by appropriate directions.
f) Installing structured reporting systems.
g) Implementing routine communication systems and procedures.
h) Establishing a control room.
i) Using desk-top computers for communication.

Hence, in any action plan, organization of work and people is a basic project management requirement. It is suggested that this must receive a communication orientation.

Project co-ordination: Co-ordination can be defined as the effort to bring parts into whole for harmonious functioning. A well co-ordinated project is as pleasing as a piece of music. Co-ordination in a project gains its importance because of the need for simultaneous working of number of activities. Therefore, one cannot proceed simply with the execution of a project without proper co-ordination. Home, it is the important task in the effective project execution and administration.

Co-ordination basically addresses itself to two aspects of work - physical matching and timing. The physical aspect would refer to what is to be done, how much is to be done and who to do it; the timing aspect would refer to when these will be done. A schedule document which deals with all these aspects of work should be prepared to enable proper co-ordination.

The work breakdown structures provide the basic frame-work for both physical and time co-ordination. The preparation of work breakdown structure, structuring the organization, establishing a project procedure manual, housing people under one roof wherever possible - sets the stage for effective physical co-ordination. Similarly development of project schedules co-ordinated with work break down structures and organization chart sets the stage for the time co-ordination.

Once the stages are so set, the day to day co-ordination in a project is ensured through:

a. squad check

b. co-ordination meeting and

c. communication

A project is a group effort and in a group there will always be differences of opinion. But coordination is not merely smoothing out differences; it is re integration of the parts into a whole facing into account the subdivided functions and their interests.

Project Organization: A sound organization for implementing the project is critical to its success. The characteristics of such an organization are:

- It is led by a competent leader who is accountable for the project performance.
- The authority of the project leader and his team is commensurate with their responsibility.
- Adequate attention is paid to the human side of the project.
- Systems and methods are clearly defined.
- Rewards and penalties to individuals are related to performance.

Project Control: Control is the process of ensuring that the actual confirm to planned results. PERT and CPM net-work diagram, Gantt Chart, mile stone analysis etc help in effective control, by timely notice of deviations and taking corrective actions.

1.11 Pre-requisites for Successful Project Implementation

Time and cost over-runs of projects are very common in India, particularly in the public sector. Due to such time and cost over-runs, projects

tend to become uneconomical, resources are not available to support other projects, and economic development is adversely affected. To minimize time and cost over-runs and thereby improve the prospects of successful completion of projects, certain pre-requisites are needed. These are:

- Adequate formulation
- Sound project organization
- Proper implementation planning
- Advance action
- Timely availability of funds
- Judicious equipment tendering and procurement
- Better contract management
- Effective monitoring

Adequate formulation: Often project formulation is deficient because of one or more of the following shortcomings.

- Superficial Field investigation
- Cursory assessment of input requirements
- Slip-shod methods used for estimating costs and benefits
- Omission of project linkages
- Flawed judgments because of lack of experience and expertise
- Undue hurry to get started
- Deliberate over-estimation of benefits and under-estimation of costs

Care must be taken to avoid the above deficiencies so that the appraisal and Formulation of the project is thorough, adequate and meaningful.

Proper implementation planning: It is necessary to do detailed implementation planning before commencing the actual implementation. Such planning should, inter alia, seek to:

- Develop a comprehensive time plan for various activities like land acquisition, tender evaluation, recruitment of personnel, construction of buildings, erection of plant, arrangement for utilities, trial production run, etc.
- Estimate meticulously the resource requirements (manpower, materials, money, etc.) for each period to realize the time plan.

- Define properly the inter-linkages between various activities of the project.
- Specify cost standards.

Advance action: When the project appears prima facie to be viable and desirable, advance action on the following activities may be initiated: (i) acquisition of land, (ii) securing essential clearances, (iii) identifying technical collaborators/consultants, (iv) arranging for infrastructure facilities, (v) preliminary design and engineering, and (vi) calling of tenders.

Timely availability of funds: Once a project is approved, adequate funds must be made available to meet its requirements as per the plan of implementation - it would be highly desirable if funds are provided even before the final approval to initiate advance action. Piecemeal, ad-hoc, and niggardly allocation, with undue rigidities, can impair the maneuverability of the project team. It is a common observation that firms which have a comfortable liquidity position are, in general, able to implement projects expeditiously and economically. Such firms can initiate advance actions vigorously, negotiate with suppliers and contractors aggressively, organize input supplies quickly, take advantages of opportunities to effect economies, support suppliers in resolving their problems so that they can in turn redound to the successful completion of projects, and sustain the morale of project-related personnel at a high level.

Judicious equipment tendering and procurement: To minimize time over-runs, it may appear that a turnkey contract has obvious advantages. Since these contracts are likely to be bagged by foreign suppliers, when global tenders are floated, a very important question arises. How much should we rely on foreign suppliers and how much should we depend on indigenous suppliers? Over-dependence on foreign suppliers, even though seemingly advantageous from the point of view of time and cost, may mean considerable outflow of foreign exchange and inadequate incentive for the development of indigenous technology and capability. Over-reliance on indigenous suppliers may mean delays and higher uncertainty about the technical performance of the project. A judicious balance must be sought which moderates the outflow of foreign exchange and provides reasonable fillip to the development of indigenous technology.

Better contract management: Since a substantial portion of a project is typically executed through contracts, the proper management of contracts should be done by looking into:

- The competence and capability of all the contractors
- Weak links that can jeopardize the timely performance of the contract.
- Issues of disciplining the contractors and suppliers by insisting that they should develop realistic and detailed resource and time plans which are congruent with the project plan.
- Penalties imposed for failure to meet contractual obligations. Likewise, incentives may be offered for good performance.
- Helps needed to contractors and suppliers when they have genuine problems - they should be regarded as partners in a common pursuit.
- Project authorities must retain latitude to off-load contracts (partially or wholly) to other parties well in time where delays are anticipated.

Effective monitoring: In order to keep a tab on the progress of the project, a system of monitoring must be established. This helps in:

- Anticipating deviations from the implementation plan
- Analyzing emerging problems
- Taking corrective action

In developing a system of monitoring, the following points must be borne in mind:

- It should focus sharply on the critical aspects of project implementation.
- It must lay more emphasis on physical milestones and not on financial targets.
- It must be kept relatively simple. If made over-complicated, it may lead to redundant paper work and diversion of resources. Even worse, monitoring may be viewed as an end in itself rather than as a means to implement the project successfully.

2. PROJECT ORGANIZATION

Once a project has been established and the goals are set, the project manager/sponsor has to act to achieve these goals. Since a manager/sponsor gets things done through others and also since most of the projects are multi

disciplinary, a project manager has necessarily to look around for help. This help can be expected both from internal and external sources; internally, from within the institution which employs the project manager and externally from various institutions and individuals having competence and skills relevant to the project under implementation. To do this most effectively it is essential to establish systematic arrangement of works, activities (or) talks between individuals and groups with the necessary allocation of duties and responsibilities among them to achieve project objectives. This process is nothing but creating a project organization.

2.1. Definition

An English author Harrison (1981) defines a project organization, " as the arrangement and relationships between client company, contractor, and sub contractor-organizations and their respective project managers who are all involved in undertaking a project in a particular environment".

Project organization must have specific objectives, a formal structure of authority with some persons in leadership roles and others in sub-ordinate roles, division of work which entails specialization by members in various activities or functions, a formal-system of communications and generally a set of formal procedures and customs that distinguish them from the social entities.

The prime objective of a project organization is to accomplish the specific project in the most economical, efficient and effective manner within the constraints of time, budget and performance or quality standards.

2.2. Forms of Project Organizations

The traditional/classical form of organization is not suitable to the projects. This is due to the following inherent features of projects.

Project is a non-routine, non repetitive work often plagued with uncertainties. It involves co-ordination of efforts of persons. The relationships in the project setting are dynamic, temporary and flexible,

The traditional form of organization has no means of integrating different departments at levels below top management and it does not facilitate effective communication, co-ordination and control.

Hence, there is a need foı entrusting an individual or group with the responsibility for integrating the activities and functions of various departments and outside organization involved in the project work.

Depending on the authority that is given to the person responsible for the project, the project organization may take one of the following forms:

i.. Line and staff organization

ii. Divisional organization

iii. Matrix organization

iv. Task force organization

v. Totally projectized organization

2.2.1. Line and Staff Organization

In line and staff form of project organization, a person is appointed with the primary responsibility of co-coordinating the work of the people in the functional departments. Such a person is commonly called as project co-coordinator/project manager who acts essentially in a staff position to facilitate the co-ordination of line management in functional departments.

He serves only as the focal point for activity control, that is, a center for information. The project manager does not have authority and direct responsibility of line management. He may gently coax line executives to strive for the fulfillment of project goals.

The project manager in this position, does not make any decision for the project, nor does he provide any staff service to the functional departments who make all the decisions relating to the project. The project manager merely collects information. Collects and communicates the same to the chief executive.

This arrangement may be chosen by a chief executive who wants to directly control the project but cannot devote much time to keep track of details. The chief executive may expect the project manager to co-ordinate and expedite the project which the latter will find a very trying proposition in view of his not having any authority.

He may influence some decisions taken by the chief executive or by the functional departments, but he cannot himself make any decision which can become binding for others. In other words, he has to rely on personal authority for getting things done and not on positional authority.

Demerits

- The project manager may find it difficult to exert leadership and feel unsure of his role due to deprival of formal organization authority. He has to influence others only through his professional competence closeness to top management and persuasive abilities.
- This arrangement may work for every small projects. It cannot work for large projects even if the project manager is provided with supporting staff since the real person, who in this arrangement wields authority and can therefore co-ordinate and expedite the project, is the chief executive who, as stated earlier, may not have much time for the project.

2.2.2. Divisional Organization

Under this form of project organization, a separate division is set up to implement the project. Headed by the project manager, this division has its complement personnel over whom the project manager has full like authority. In effect, this form of organization implies the creation of a separate goal oriented division of the company with its own functional departments.

This form of organization facilitates the process of planning and control, brings about better integration of efforts and strengthens the commitment of project-related personnel to the objectives of the project, the project manager in this role provide departments who will execute the project.

The project manager, in this case, will-be a specialist in project management tools and techniques, and in view of his superior knowledge relating to scheduling, budgeting and information systems, he is in the best position to advise other functions. A project manager in this role can also carry out service activities like collection and transmission of data, follow-up one functional group to service another group, maintain records, measure progress, analyze progress and prepare progress reports. He may also act as a single focal point regàrding communication between various participating functions and between his company and other interacting companies.

It is to be rioted that in each case, while he performs a service for the participating functions, he does not take any decision for them. Nor does he direct the various functions such as new schedules, budgets or technical co-ordination are to be achieved. He may advice the functional groups but a final decision would rest with the functional groups. He does not, therefore, have any

authority which can shape the destiny of a project. Figure shows such an arrangement. Most companies tend to use this arrangement when project management is used for the first time in the company as this does not require much change in the working of the organization.

It is also interesting to note that a project manager in such .an arrangement fully identifies himself with the project and considers himself responsible for its successful completion. However, the fact remains that at times of adversity the project manager, in such an arrangement, is liable to throw up his arms and declare that he could be held least accountable for fulfillment of the project goals as he hardly had any voice in its execution.

Demerits

- The drawback in this arrangement is that while a great deal could be expected, not much may be delivered. The project manager would expect to be heard, but he might not. The functional managers would expect him to take all the responsibilities without any authority, but he cannot. Yet, as has been mentioned before, it will be for the first time that someone other than the chief executive will claim a project as his own and work as best as possible forks success.
- It is quite possible in this arrangernent to encourage direct communication with the work force, or the source where work is being done, without going through the times of authority. This arrangement, however, would not entitle the project manager to issue instructions to the work force however senior he may be in the organizational hierarchy. Any instruction has strictly to come from the functional base irrespective of whether it relates to schedule, budget, information system or co-ordination with other functional groups or outside agencies.

The direct approach, though devoid of any authority, may not get automatically accepted unless this has the backing of the chief executive and in course of time becomes an organizational practice. Yet if lines of communications are not made direct, there would be inordinate delay and much of the advantage that could be expected from the arrangement would not be there.

2.2.3. Matrix Organization

The line and staff form of organization is conducive to an efficient use of resources but is not suitable for an effective realization of project objectives. The divisional form of organization is suitable for an effective realization of project objectives but not conducive to an efficient use of resources.

The matrix form of organization seeks to achieve the twin objectives of efficient use of resources and effective realization of project objectives the cost of greater organizational complexity, of course. A competent project manager will succeed in acquiring some authority because of his sheer identification with the project and its cause to the extent a project manager is able to acquire the authority, the functional manager will be forced to dispense with the same. When this arrangement of sharing authority between a project manager and other functional manager it formalized, we have an organizational form which is known as Matrix Organization.

	Functional Manager		
Project Manager	*Functional Manager A*	*Functional Manager B*	*Functional Manager C*
Project Manager X	A1	B1	C1
Project Manager Y	A2	B2	C2
Project Manager Z	A3	B3	C3

Flow of functional authority

A matrix, as shown in Figure, is a concept borrowed from algebra where an individual will abide by the decisions made by two superiors - one belonging to the project and the other to the specialized function. One will be his direct line boss and the other his project boss. Both are responsible for the successful completion of the project and, therefore, both ought to have authority over the working force through whom the project is being executed. The following figure shows the matrix organization.

A mutually supportive relationship should exist between the partners in a matrix set up for the successful execution of a project. Matrix organization is, thus, a deliberate attempt to provide authority, i.e., a chair to those who are asked to assume responsibility, and as long as one does not put one's chair before one in dealing with work, there should not be any problems.

The main feature in the matrix operation is that, the parties involved in the matrix will have a common concern as well as a specialist concern. As long as the parties respect the specialty of the others and look to one another for help and support for the common cause, a matrix will work extremely well. But if one assumes that what should have been a common cause is not common, and also believes that help would not be forthcoming unless the other party is forced, a matrix is unlikely to succeed.

Referring to the domestic matrix, the mother is supposed to concentrate on the home and the father on the career. It works in a similar manner in a project too. The functional departments provide the individuals with expertise for projects to use, and a home to return to when the expertise is no longer needed by the project. The project merely requisitions the expertise and directs its use in the best interest of the project. So the project should decide what is to be done, when it is to be done and at what budget, it should be for the functional departments to decide who should do it, what back-up he should be given, what norms and standards he should follow so that the work is completed as per specifications and within the time and budget.

Trouble normally starts when the functional departments would not take-up the work that is needed first or would not deploy resources to do it within the time and budget. The work may happen when resources to do it within the time and budget. The work may happen when resources are withdrawn with-out the project manager's prior knowledge. When things, occur as above, the arrangements no doubt is a weak matrix. On the other hand, if the project manager starts deciding who should work for them, encourages violation of functional standards and norms, gives technical decisions without consulting functional departments, does not allow withdrawal of staff for training or optimum utilization of the potential of the concerned staff, then the arrangement is stronger than a strong matrix. In either case the company executing the project is not going to get the best from its people. From the project manager, they will be required to follow the home organization's policies and procedures. If there are directions from the project manager asking violation of functional policies and procedures, the task force will notify both the functional head and the project manager. The functional manager may either accord approval or take it up in case, the functional manager and the project manager cannot settle it between themselves. On the other hand, there may not be any reference at all to the functional manager or corporate management, if the project manager sorts it

out at his level by taking the functional staff into confidence whenever decisions are made.

Ideally one would like to see both the parties are understanding mutually supportive and not trying to overtake each other. If the matrix ever operated at that level, the arrangement can be called a balanced matrix. Much as one would like to see a matrix remain balanced, it may not remain so not early because of the personality factors of the partners but because the company may not want it to remain balanced.

Thus, a matrix may be filled either to the project side or to the functional side depending on circumstances. If the project influence is more in decision-making for the project, then the arrangement is considered a strong matrix. On the other hand, if the functional departments are seen to be influencing the decision-making more, the arrangement is considered a weak matrix. While a company may operate on matrix, one may see it operating with different strengths in different projects.

But such problems are very real in the operation of a matrix. It may be weaker than the weakest acceptable or stronger than the strongest desired. A balanced matrix where there is a balance of power between the project manager and the functional manager is an ideal but non-exist out situation. Therefore, many people consider a matrix a complex organizational arrangement and would like to avoid it if possible.

A matrix is also expected to work for very large and complex projects, but in practice, it adds its own complexity. A matrix is also effective for small but complex projects where many multi disciplinary specialists are required for short durations. However, unless the number of such projects are many, a matrix arrangement would not he justified

2.2.4. Task Force Organization

An alternative arrangement which clearly accords authority to the project manager and avoids disillusionment of either the project manager or the functional manager due to mal-operation of the matrix is the task force organization. In this arrangement the project manager is delegated the full authority to make decisions for the project, but that would be required to operate within the functional organizations' policies and procedures. There is clearly no intervention from the various functional departments, no dual decision making

and no dual reporting relationship for the working force, the project manager makes all the decisions but within the policies and procedures laid down for him.

A task force is created by drawing personnel from various functional departments and putting them under the project manager. The staff so assigned will continue to receive administrative support from their home departments but they will respond only to the project manager.

Unlike the matrix, the loyalty of the functional staff in this arrangement is clearly with the project. The functional department's influence is virtually non-existent. Therefore, unless the functional representatives have strong functional commitment, functional excellence is likely to be compromiseu for expediency. The functions will require strong corporate management support to ensure adherence or policies and procedures laid down by them.

Naturally, the time and cost objective of the project will receive the best attention in this arrangement, but one cannot be too sure about the quality objective. The project with this arrangement moves very fast, and that is the single dominant reason why many people would prefer a task force arrangement.

There may not be any real risk in going for a task force arrangement if the technology for the project is simple, and the project is also small. The functional staff in that case need not be a top specialist. One specialist may cater for multiple disciplines. This ensures maximum utilization of specialist time which is normally not expected to happen in a task force arrangement.

2.2.5. Totally Projectized Organization

A totally projectized organization is an arrangement in which the project manager has total authority even regarding functional policies and procedures. There is no constraint whatsoever with respect to any function. The functional specialists have no one to notify. They will be carrying out what the project demands and the project manager instructs.

Many people compare this arrangement to a mini company, a totally autonomous organization in which the project manager is the chief executive. It will, necessarily have decisions and departments headed by very senior functional specialists who can function independently without any support whatsoever. They would act on behalf of the project manager for taking decisions in their area of competence.

Such an arrangement is obviously possible when the project is too large and complex or geographically so located that there is no way of managing it without granting autonomy to the team handling the project. The project manager for such a project will obviously be a very senior person to justify delegation of so much authority by the company. The project manager, in such an arrangement, will be required to carry out lot of administrative functions besides his core project business. It would not be surprising to find the project manager spending more time in the administrative matters than on the business of the project in this type of arrangement.

Yet this arrangement may he justified for a project because of its size, complexity, location, importance to the company and also need for special treatment, particularly in case of a jolt or collaborative project or if the financial institutions so desire that it be organized that way.

The totally projectized arrangement may also be desirable if the company is executing only one gigantic project.

A matrix is also expected to work for very large and complex projects, but in practice, it adds its own complexity. A matrix is also effective for small but complex projects where many multi disciplinary specialists are required for short durations. However, unless the number of such projects are many, a matrix arrangement would not he justified. So either total projectization or fast force arrangement would appear to be the best arrangement for executing most projects. And in both these arrangements the project manager is delegated authority commensurate with the responsibility he is expected to undertake. Project objectives get primary attention in both these arrangement.

The traditional form of organization is not suitable for project work because it has no means of 'integrating different departments at levels below the top management and it doesn't facilitate effective communication, coordination and control. Hence, special project organizations are needed.

3. NET-WORKING

A project with multitude of activities must be integrated and well knitted together. The activities must be net-worked so that all activities are executed in right sequence and commenced on time and completed in time.

Network techniques are useful techniques in project management arena. Project is simply a major work - like constructions, installations, designs,

commissioning of new products, setting up a business and so on. Several activities are involved in a project. There is some order in which the activities have to be taken up. Certain activities have to precede some activities and succeed the rest. Some activities can be simultaneously taken up. The time required for completion of each activity has to be known. The resource required need to be known. All these if made available in the net-work, things will go very well. A net-work diagram will reveal all these neatly.

The network analysis defines the jobs to be done, integrates them in a logical time sequence and finally, more important, affords a system of dynamic monitoring and control over the execution and progress of the project. The 'how' of these distinct applications is dealt in this section.

The following Table gives the activities involved in a project, say the manufacture of cars. The days and employees needed for each activity per day and total number needed for completion of each activity are also given. We can draw the net-work and find the paths and the critical path.

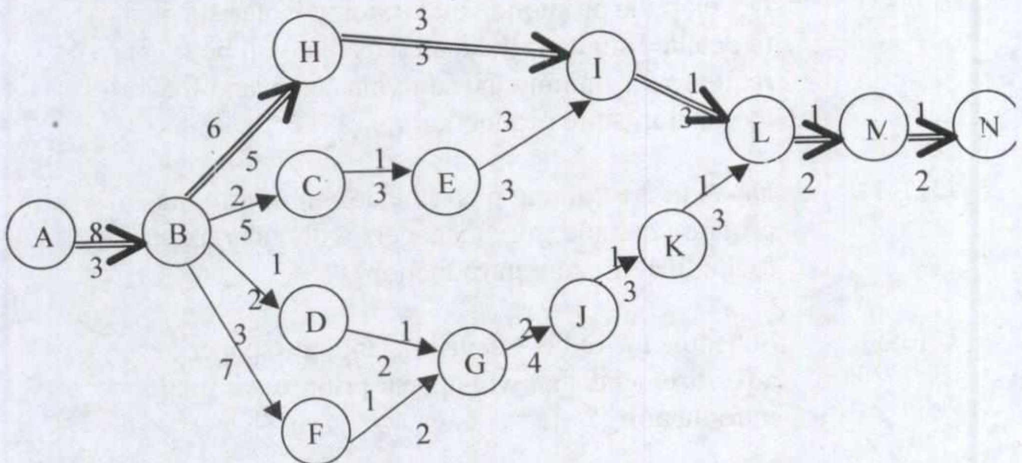
Table: Activities in the Project, Duration and Employees needed per day for each activity and total number of employees needed for completion for each activity:

Activity	Days	Employees Needed		Activity	Days	Employees Needed	
	Needed	Per day	Total		Needed	Per day	Total
A – B	8	3	24	H – I	3	3	9
B – C	2	5	10	E – I	3	3	9
B – D	1	2	2	G – J	2	4	8
C – E	1	3	3	J – K	1	3	3
E – F	3	7	21	I – L	1	3	3
D – G	1	2	2	K – L	1	3	3
F – G	1	2	2	L – M	1	2	2
B – H	6	5	30	M – N	1	2	2

Figure below gives the net-work diagram for the above project.

The numbers above and below the arrows indicate the time required and employees required for completion of respective activities. Until design A-B, is completed activities B-C, B-D, B-F and B-H cannot be taken up. Hence, all these activities have common start node, viz. B. Activity G-J cannot be taken up, until activities D-G and F-G are over. So activities D-G and F-G converge at `G' and so on. No dummy activity is needed for the project.

Figure · NET WORK DIAGRAM



A brief description is presented on the network in fig 1. Node or event A is the starting point. Node B indicates the completion of say the `design' work. A-B, therefore indicates the progress of design activity, which needs 8 days for completion 3 employees per day. The number of days needed for an activity is written above the arrow, while number of employees or any resource or combination of resources needed written below the arrow of the activity concerned. Thus the numbers above and beneath the

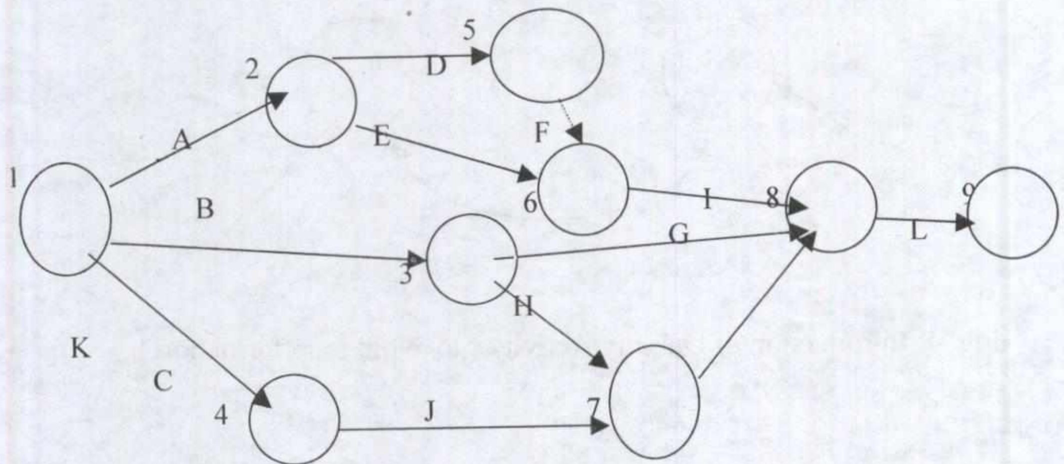
Illustration 2. Let us consider construction of another network for a project of an advertising campaign.

LIST OF ACTIVITIES FOR THE ADVERTISEMENTCAMPAIGN

Activity symbol	Activity description	Immediate predecessors
A (1-2)	Develop the advertising plan (a detailed plan of projected radio, television, and newspaper advertisement)	-
B (1-3)	Develop the promotion and training materials plan (a detailed study of the materials that will be required for training the store managers and for the final in-store production)	-
C (1-4)	Develop the training plan (the design of training program that the store managers will undertake prior to the final in-store introduction)	-
D (2-5)	Schedule the radio, television, and newspaper advertisements that will appear prior to the final introduction	A
E (2-6)	Develop the advertising copy that will be required	A
F (5-6)	***A "dummy" activity (one that takes no time) which simply indicates activity I can't begin until activity E has been completed; further explained below***	D
G(3-8)	Prepare promotion materials which will be used during the in-store introduction	B
H (3-7)	Prepare materials which will be used in the training program for the store managers	B
I (6-8)	Conduct the pre-introduction advertising campaign in the media	E, F

J (4-7)	Screen and select the store managers who will undergo the training	C
K (7-8)	Conduct the training program	H, J
L (8-9)	The final in-store introduction of the Campaign	G,I,K

Figure 2: Network Diagram for the Advertisement campaign



Drawing the network. With the list of activities carefully checked to make sure that all activities are included and all predecessors correctly identified, we can draw the diagram in figure 2. This shows not only all the activities in Table but also all the predecessor relationship among the activities in the network.

From figure 2 you can see that a PERT network is simply a network of numbered circles connected by arrows. In PERT, we call the circles as *nodes* and the arrows as *branches*. The arrows represent the activities in the project, and the nodes are the start and finish of those activities. If all activities leading to the node are finished, node can be called an *event*; in the advertisement campaign network, circle 8 (which we will call node 8 in network language) can be happen only when activities G, I, and K are complete.

Dummy activities in PERT.

There is one dummy activity in the network, activity F(5-6). What does this mean? Had this not been used in that format, it might have appeared that activities D and E had the same starting and ending nodes as in figure 3. However, in PERT we avoid this by putting in a dummy activity F, so that the network can be drawn as in figure 4.

Fig. 3 : Loop Formation

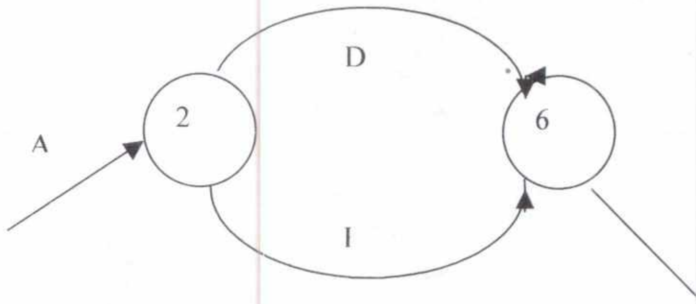
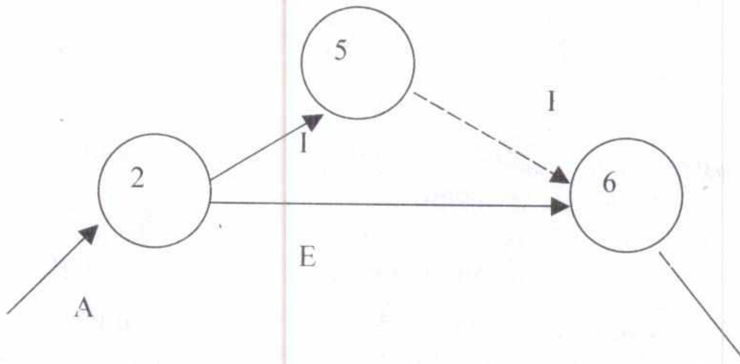


Fig. 4: Introduction of Dummy Activity (to avoid loop formation.)



The dummy activity in PERT let us draw networks with proper precedence relationships. The dummy activity F indicates I cannot begin until both D and E are completed. The dummy activities exist solely for the purpose of establishing precedence relationships and not assigned any time.

4. CONTRACTS

The project charter and the organizational arrangement accords the project manager appropriate authority over the in-house resources. But not all projects can be executed with in-house resources and the project manager has to requisition extra-organizational resources for the execution of the project. When a project manager has to get things done with resources over which he has no direct authority, it becomes necessary to acquire the required authority in lieu of some considerations. Such an arrangement can be termed as a contract and the authority so acquired as contractual authority. If this authority is acquired in-house through a contract, then the process can be termed as internal contracting. All other contracts for the acquisition of authority can be termed as internal contracting. All other contracts for the acquisition of authority can be termed as business contracts.

4.1 Business contracts

A contract as such is an agreement between two or more parties in writing, to do or not to do certain things. Business contracts are those agreements which are enforceable at law. They are entered between two or more competent parties for a legal consideration which is usually payment in the form of money. For an internal contract the consideration is normally absent. Legally, of course, a contract can be valid even though there may not be any consideration, but then it is not a business contract.

In order to enter into a contract, there must first be an offer or proposal signifying the willingness of one party to do or abstain from doing something at the desire of the other party. The desire of the other party is expressed in the enquiry often known as Notice Inviting Tender (NIT) and the offer to carry out the services at certain terms is known as Tender.

The sequence of events resulting in a business contract are as shown below:

Enquiry	Issue of NIT to selected parties or to the newspapers by the project authority and sale of tender document
Offer	Submission of the tender document by the bidder
Acceptance	Communication from the recipient of the offer to the bidder indicating intent to enter into an agreement and acceptance of the same by the bidder

Agreement	Offer and considerations as accepted given a legal form and content duly signed by competent authorities of both parties
Contract	The contract consists of an agreement on stamped paper a detailed letter of intent with agreed variations and the original tender document

4.2. The R'S of Contracting

Contracting, whether it is for a consideration or otherwise, is a essentially an arrangement for getting work done in an environment where authority relationships and responsibility delineations are unclear or non-existent. It is said that contracting is practiced even in a domestic environment where parents obtain desired behaviour from a child for a certain consideration. The same continues without our being aware of it in all our social relationships. Knowledge of contracting is, therefore, as much a basic requirement for day-to-day living as that of the three R*s.

If one chooses not to over-play the legal aspects, contracting itself can be found to constitute the 3 'R's only. The 3 'R's in the case of contracting are: ***Responsibility, Reimbursement and Risk.***

4.2.1 Responsibility

The first 'R' in a typical contract covers issues such as:

- What to parcel out to the contractors and what to retain
- How to define the work parcels so that the contractors know their scope precisely and there is no overlapping, undefined, unallocated or ambiguous work areas.
- What are the relevant performance parameters for fulfillment of which contractors must assume responsibility.

Collectively, the above are often referred to as scope of work. Schedule of work, technical specifications, scope drawings, special conditions of contract, responsibility of matrix and special write-ups in appropriate combinations are used to ensure clarity.

The factors listed below may be considered while taking a decision on a contract.

i. Specialty of the works
ii. Location of the work sites
iii. Value of the contract
iv. Availability of the contractors
v. Need to accommodate local contractors
vi. Need to obtain performance guarantee for a system from a single party
vii. Concern for early completion
viii. Concern for completion at minimum cost
ix. Concern for top quality
x. Current work load of the contractor and capability of the contractors
xi. Time schedule of the work
xii. Political pressure

4.2.2 Reimbursement

The second 'R' of a contract refers to the type of reimbursement and it is as important as the first 'R'. Perhaps this 'R' is more important for the contractor than the owner. While the owner may refer to the responsibility to describe the contract arrangement, the contractor may choose to refer to it by the types of reimbursement such as lump sum contract, item rate contract, etc. We shall, however, prefer to use responsibility as the basis for assigning any name to a contractual arrangement.

a. Lump-sum Vs. Cost-plus

In order to make a lump-sum offer, a contractor would like to have all the details. If the details are not known he would like to build contingencies in his price to take care of the unknowns. It is this aspect of pricing that can make a lump-sum contract more expensive than a cost-plus contract.

On the other hand, if the work can be framed out by the owner at a fixed price, the owner would know at a very early stage of the project his total liability and also if he is going to be within the approved budget or not. His anxieties to that extent will be less. With cost-plus contract, the owner would not have the advantage of knowing what the total cost is going to be till a very late stage. The

owner will therefore, be anxious all the time due to this uncertainty. Naturally, wherever possible the owner would like to go for a lump-sum contract.

The specialty of the cost-plus contract is the opportunity it provides to start work immediately, thus eliminating the need for detailed scope definition arid preliminary engineering by the contractor in submission of his proposal. It allows flexibility to the owner to change his mind at any stage with-out being forced to pay exorbitantly. The owner can also upgrade his design, specification and quality of construction without any objection from the contractor.

4.2.3. Risk factor

The last 'R' of a contract refers to the risk factors. Both the owner and the contractors are so much concerned about this 'R', that most of the pages of a contract deal with only this matter. In fact, a contract is considered to be an instrument for transfer of risk from the owner to the contractor, and necessarily this should evoke some resistance from the contractor. The least that a contractor would do is to seek protection in one form or other. But while the contractor risks only his fee, the owner runs the risk of not having his plant at all. Naturally, the owner would seek more protection and would not like to take any risk against which he does not have adequate insurance. The insurance, however, cannot be always in the form of a financial insurance policy. Only small risks can be covered by insurance and a little more protection may be provided in the contract document. However, most of the risks are usually covered when contracts are awarded through a proven contracting process.

4.3. Tendering and Selection of Contractor

A contract presumes that the parties entering into a contract are competent and normal. But if, for instance, the contractor selected for a specific work is not competent technically, financially or managerially, then the risks will multiply several times. This uncertainty must, therefore, be resolved at the first instance. A well laid out procedure for prequalification of contractors and tendering can resolve this uncertainty. Such a procedure is known as tendering procedure.

A tender may be defined as an offer to carry out certain work or supply certain material or services in accordance with clearly detailed descriptions and conditions. The tendering procedure deals with prequalification of contractors, preparation offender documents, mode of floatation of enquiry, receipt offender guidelines for evaluation offenders and selection of contractor. We will discuss

this in some details in the context of reducing risk and uncertainty in the execution of a project.

The need for contractors originally arose because plant sizes grew to such an extent that it became almost impossible for the traditional equipment suppliers to perform their own function efficiently as well as to deal with the organization, administration and overall design problems connected with completion of planned projects. Bearing in mind that a contracting firm will usually tender only for plants worth several million dollars, it will be appreciated that the preparation of a tender is a major operation in itself and may cost (in the case of a substantial project) up to US $250,000. The cost of preparing turnkey tenders may be re-estimated between 1 and 2 per cent of the value of the project, unless it is a repeat project (such as a complete plant of a similar size),

In the case of large projects, there are likely to be only two or three competitors tendering, and they are often pre-selected once they have an established reputation in the same or similar fields with projects of the same order of magnitude. In fact, some firms now prefer to by-pass the procedure of competitive tendering altogether on some projects because of the cost involved and instead to negotiate direct with a single favoured contractor. Nevertheless, a contractor must have the facilities available to tender for complete plants on a lump sum turnkey basis, if necessary.

4.3.1. Prequalification of contractors

For prequalification of tenders, notifications are issued in the press, at embassies etc. as appropriate giving details such as name of the purchaser/ engineer, outline of the project, enquiry issue and tender submission dates, instructions for applying for prequalification and submission date for the contractor's prequalification data.

Normally, a prequalification document, issued on request to a contractor seeks information on the organization, experience in the intended type of work, availability of resources like managerial, technical, labour and plant, and also asks for financial statements. The contractor desirous of prequalification responds to the questionnaire and such details as may enable his qualification.

The data supplied by the contractors are evaluated for the preparation of a short list. The purchaser or his engineer would normally select a contractor for inclusion in the short list offenders if:

i) He has had similar experience earlier and his performance reports for previous contracts are satisfactory.
ii) His past turnover and present financial commitments indicate no constraint on fund availability for execution of the proposed contract.
iii) He has the necessary infrastructure, adequate technical manpower, construction equipment and his present commitments would not prevent him from executing the proposed assignment satisfactorily.
iv) His credibility in terms of his associates and associations with other agencies including foreign agencies, job performance and relationship with customers are sound.

After evaluation, the short-listed contractors are informed about their selection and their confirmation obtained as to whether they will submit the tender.

4.3.2 Preparation of tender documents

A tender document is prepared by the purchaser/engineer in as detailed and clear manner as possible to define the technical requirements of the work involved as also the responsibilities which the purchaser and contractor will have to share between themselves. A good tender document will include the following:

i. Letter of invitation to tender
ii. Instruction to tenderers
iii. General conditions of contract
iv. Technical specifications
v. Special conditions of contract
vi. Scope drawings
vii. Bill of quantities
viii. General information about site
ix. Form of tender

Professional institutions like Institute of Mechanical Engineers have also standardized the tender form. A tender form for supply and erection of plant and machinery may cover the following items it the order listed below:

i. Price

ii. Programme
iii. Terms of payment
iv. Conditions of contract
v. Contract price adjustment
vi. Validity

The document is then issued to the short-listed contractors for submission of their tender.

4.3.3. Receipt of tenders

The tenderers may make a request to visit the site. Normally, the purchaser/engineer accompanies the tenderers to the site and provides further information. There may be a pre-bid conference to clarify the various issues to the tenderers. Supplementary queries can be clarified through correspondence till the due date for the bidding. On the due date bids may be opened in front of the tenderers present. The purchaser/engineer will announce and record the names of tenderers and prices including prices of alternative tenders. They would also announce and record the names to tenderers, if any, who are disqualified due to late submission.

4.3.4. Evaluation of tenders

The tenders are evaluated from technical, commercial, contractuai and managerial angles. Contractor's confirmation or classifications are sought on various matters which either do not conform the tender requirements or those that have not been offered by the contractor. The correspondence may reduce the points of disagreement but a post-bid meeting often cannot be avoided. Normally, separate meetings are held with each contractor to obtain clarification and also to bring all the offers in line with the tender requirement. The actual evaluation process includes checking the acceptability of the offer against technical specifications, management specification and various commercial and contractual terms and conditions. An adjusted contract price will be arrived at in each case. Normally, the lowest bidder who is also technically and managerially acceptable is awarded the contract.

4.3.5 Agreement

An agreement is now to be signed on a stamped paper. The form of agreement is probably the most standardized document. The form of agreement refers to the various documents which will together form the contract.

The accompanying documents normally are:

1) Original tender papers comprising the conditions of contract, specifications, dates, drawings and other relevant information.
2) Schedule of rates/prices including those for engaging workmen, equipment, etc., for contingent works required during execution not envisaged at the tendering stage.
3) A list of deviations from original tender stipulations as mutually agreed upon between the purchaser and the contractor after discussions.
4) Other relevant attachments.

4.3.6 Form of guarantee

Finally, whenever required, a guarantee from sureties in standard form may be asked from the contractor as an insurance against uncertainties in dealings with the contractor. It may go like this: "Now we hereby jointly and individually guarantee to the purchaser punctual, true and faithful performance and observance by the contractor of the covenant on his part contained in the said agreement and undertake to be responsible to the purchaser, his legal personal representatives, successors or assignees as sureties for the contractor for the payment by him of all sums of money losses, damages, cost charges and expenses that may become due or payable to the purchaser from the contractor in consequence of default in the performance. Nevertheless, the total amount to be demanded shall not exceed 15 per cent of the contract price".

This guarantee shall not be revocable by notice and our liabilities as sureties here-under shall not be impaired by any alterations made or agreed to in the general conditions of contract.

4.4. Types of Tendering Process

The tendering policy of most contractors can be categorized into one of the following three types.

Highly selective tendering: This is often historical in origin and is followed by contractors with long experience with a certain industry, product of process. This type of tendering has the advantage of low costs and a high proportion of successful contracts achieved by negotiation rather than competition. The danger is that the contractor is susceptible to changes in the industry concerned and to technological innovations.

Moderately selective tendering: This is the most common type, particularly among European contractors whose favoured fields of operation are discernible. The danger is that firms can become too complacent or, on the contrary, that they are unable to restrict their activities.

Indiscriminate tendering: This is tendering for all projects without regard to the type and/or value. While a broad front is offered, a large number of small contracts must often be undertaken with a disproportionate amount of supervision and design cot, giving rise to high tendering costs. The acceptance rate is generally lower than for more selective tendering.

4.5 Global Tendering and Bid Evaluation

These are very significant to the project managers engaged in design, construction, execution, installation, operation and maintenance of large-scale assets in order to derive optimum benefits from the capital intensive projects. Global tenders are issued for high tech requirements particularly associated with international credits like world bank loans. Since the source of supply may be outside the country, a detailed plan must be done and global tender must involve simplicity in language and clarity, specifying tendering and accepting authority. It is necessary to ensure that the accepting and tendering parties must be specific to commit. Tendering is nothing but visualization of various events that have to take place in the execution of contract spread over two to three years, and legislating for the buyer's stand in respect of all these, which should be practical, consistent with canons of financial propriety and allow for proper legal actions.

The chief merit of global tendering is that it gives equal opportunity to every supplier/contractor in the world to make an offer within the terms and conditions of tender and thus it promotes competition. Global tendering is particularly recommended to ensure safeguard against public procurement.

Bids must be procured from really interested parties by proper pre-qualification and applying the bid bond clause. The tender is awarded to the responsible bidder whose price is the lowest, provided it is deemed reasonable and most advantageous. The bidder has to satisfy himself that full information has been furnished as required in the specifications, as lack of information will be at the risk of rejection of bid. The bids received will be scrutinized by the

project team according to the bid evaluation criteria to ascertain the most suitable evaluation of bid for the total project.

4.5.1 Initial evaluation

Once the bids are received, the project authorities evaluate them on a preliminary basis, with a checklist, as to whether all key points, including commercial terms, costs, delivery schedules and other contractual aspects, have been fully covered.

In order to shortlist the vendors, the acceptable bidders are arranged in ascending price order, after eliminating bidders with unacceptable quotations, or with incomplete bids. The preliminary evaluation enables to focus greater attention on a few vendors with competitive bidding, the need (if any) solicit additional information.

4.5.2 Technical evaluation

After initial scrutiny of the promising bidders' information, a complete technical evaluation of the bids of the potential suppliers is performed by tabulating the data in a suitable way. It is desirable to specify for the short-listed vendors the following checklists in program. Vendor, quotation reference, quotation date, validity expire date, vendors complete address, local representative, complete delivery material delivery point, basic price of material escalation terms, payment details, recommended spares, mandatory spares, shop assembly, shop painting, shop testing, packing, graphs, catalysts, lubricants, drawings, engineer services, warrantees, import duties, agents' fees, currency exchange etc., inspection fees, adjusted base cost, freight cost, operating cost, feed stockiest, utility cost, field service estimate, allowance for estimated extras, total estimated present cost also form a part of the checklist. It is necessary to scrutinize additional costs/savings and availability of vendor support at this phase.

4.5.3 Commercial evaluation

The detailed commercial scrutiny is usually conducted after evaluating the bid technically. The commercial scrutiny consists of checking whether everything in the specification is covered in the price. These aspects include the following: drawings, documents, maintenance, operating manuals, test facilities, test certificates, painting and insulation, shop assembly, packing, crating, field service, freight to delivery payment, warranties, guarantees delivery date, unit

rates, bases of escalation, discounted value of money, currency exchanges, imports costs and costs of additional services are verified. The conversion of quoted costs to present values applies to down payment, progress payment, final payment, operating costs, variable annual costs, escalation costs, field service costs and other cost components

4.5.4 Pre-award meetings

It helps the project authorities to meet the short-listed vendors in a private conference prior to selection for reviewing any questions which have arisen during the technical and commercial evaluations and to confirm all aspects of the bid. It is desirable that a team of senior officers connected with the project meets, separately, the short-listed vendors so that negotiations, if necessary, can take place smoothly and also to have discussions on ethical considerations.

4.5.5 Bid conditioning

The conditioning process helps the project authorities, to consider intangible and other factors which might influence vendor selection. A low bid may not necessarily be the cheapest bid when the following aspects are considered: additional expediting, follow-up of stage-wise inspection, more engineering follow-up, additional engineering review, delayed receipt of drawings, interchangeability of spares with existing equipments, local vendors, local pressures/support, future service availability, initial maintenance, compatibility with existing infrastructure, additional support facilities application of learning-curve for cost-reduction, transporting over dimensional consignments, etc.

4.5.6 Vendor selection

The vendor selection process is accomplished by the project committee. The technical aspects are reviewed by technical personnel, while the, commercial aspects arc evaluated by finance/commercial officers. A detailed presentation of the pros and cons of all aspects of the individual vendor is mad and a vendor is finally chosen.

4.5.7 Pre-commitment meeting

The pre-commitment meeting with the vendor enables the suppliers to know that he is likely to get the contract. A formal agenda is made to cover a comprehensive review of specifications, contracts, and commercial terms in

152

order to reduce misunderstanding between the two parties. A broad identity of views on all aspects is reached between the two parties. If the vendor has some lingering doubts, these are recorded in written statements.

4.5.8 Formal award

The last step in the whole exercise is to formally award the contract to the vendor. A telex or telephone order is initially placed. A formal written purchase order, together with necessary documents, data sheets, specifications, contractual terms, etc., is handed over to the vendor. After choosing the vendor, the next stage of follow up of the contract's implementation on manufacture, transport, installation is planned, so that efforts are made to commission the project in time.

4.6 Steps Involved in Bid Preparation

Steps involved in bid preparation are given below:

4.6.1 Pre-bid invitation stage

i) Define as precisely as possible the need that is to be met.

ii) Identify the product that will meet this need.

iii) Specify operating and other relevant parameters.

iv) Lay down specifications, as required, by reference to:

a. Standards:
   - i) national;
   - ii) international;
   - iii) other country's;
   - iv) industrial associations

b. Brand names

c. Catalogues of sellers

d. Drawings, engineering designs

e. Samples

v) Specify test methods and procedures.

vi) Research supply market to know the structural characteristics of the inter national market for the product.

vii) Decide on procurement method and strategy.

viii) Identify potential suppliers, through desk research.

ix) Shortlist the more reliable ones through a pre-qualification system.

x) Prepare bid documentation and the invitation to tender. Define contract terms and conditions and scope and nature of guarantees required. Check for precision and completeness.

xi) Establish evaluation criteria.

4.6.2 On receipt or opening of bids

i. Examine the compliances with instructions.

ii. Timeliness of submission

iii. Completeness of documentation (e.g. bid bond and guarantees)

iv. Authorized signature on bids

4.6.3 At bid-evaluation stage

i) Design a suitable format for bid tabulation,

ii) Reduce all variables in different bids to a comparable basis, e.g. either ail FOB or CFR terms.

iii) Express all prices/costs in a single currency and use an appropriate exchange rate for the purpose.

iv) As the ultimate cost to the buyer is more important than the price, compare the relative cost of supplies from different bidders and not only their price quotations.

v) For equipment, be assured by the supplier of the later availability of spares/ replacements and their supply price.

vi) As operating costs are an important element of evaluation, as the initial cost of the equipment, adopt a total-costing/life-cycle costing technique when evaluating bids for equipment.

vii) As the time profiles of the costs and possible revenues of different bids are likely to differ, use the net present value technique and take into account the serviceable life, salvage value at the end, and operating costs.

viii) Follow these two objectives for the technical evaluation:

- Assess deviations from prescribed specifications and, if these are acceptable; make appropriate adjustments to the price for positive and negative deviations to compare offers.

- For commercial evaluation, reduce the payment terms of different offers fur productivity differentials (use of material and/or human inputs per unit of output).

ix) For commercial evaluation, reduce the payment terms of different offers **to** a comparable basis. In the case of deferred payments, make use of the net present value analysis technique.

4.7. Delivery Terms of Contracts

There are five main types of contracts that are currently used by process plant contractors. In order of decreasing degrees of the fixed price element, these are as follows:

- Lump sum (fixed price) contracts
- Guaranteed maximum contracts
- Target price contracts
- Cost-plus-fixed fee contracts
- Cost-plus-percentage fee contracts

The less experienced clients tend to prefer the **lump sum type** of contract as this results in the greatest competition between contractors and the evaluation of bids is easy. Contractors' bidding costs for this type of contract are at their highest and there are disadvantages. Not only is the bid time quite long, but such bids are highly inflexible, with any changes being difficult and expensive. Costs may be high to cover any contingencies and risks, and the client-contractor relationship tends to be more divergent than with other types of contract. Finally, the emphasis on the low bid may give an unsatisfactory end product.

Fixed price contracts are used mainly where the client is in a position to specify exactly what is to be built and where much of the engineering work must be carried out prior to signing of the contract. Other types of contracts may be converted to a fixed price contract when the work is sufficiently advanced to permit an accurate, maximum cost estimate to be made.

Typical payment terms for engineering work are an initial down payment made on contract signature, several installments paid at intervals during plant construction, and a final payment due after satisfactory completion and the expiry of any performance guarantee period. In some cases, periodic installment payments may continue over several years after plant completion. Installments

may fall due upon contract signature, during deliveries of equipment and plant construction, after completion of acceptance costs, or at set time intervals.

Great care must be taken over the wording of payment terms since loosely worded provisions can result in substantial financial losses to the contractor, particularly if installment payments are determined by the dates of tests and the commissioning of units. Whenever possible, fixed dates should be written into the agreement for individual installment payments to avoid excuses for postponement being made by the client, some of which may be trifling in nature. To minimize such risks, the contract should also clearly specify the exact documents and certificates required before a payment can be authorized.

4.8. Negotiation

Investments in projects involve huge capital outlay. Hence the project manager, in collaboration with the finance and purchase departments, deliberates with the equipment suppliers on quality, delivery schedule, price, payment schedule, service and other relevant legal contractual aspects. This process of deliberation is known as negotiations.

4.8.1 Parameters of Negotiation

There are a large number of aspects that my crop up in the negotiation process. Some of the important areas in which the buyer and the seller may concentrate are mentioned below. These are price, cost, terms and conditions of the original contract; variations in quantity; specifications and deviation from specified tolerances; basis for price revision or escalation; facilities to be provided by the project authorities; quality of subcontracted items; unforeseen amount of construction maintenance repairs; continued supply of spares; buyback arrangements of initially dumped unwanted spares; supply of critical drawings; performance guarantee after initial warrantee is over; after sales service; technology up-gradation after initial supply of equipments on a continuous basis; interpretation of legal terms; basis for penalty/bonus; payment schedule; moral/ethical aspects; dispatch terms; instructions on insurance; removal of rejected items; and risk purchase clause in the event of changes in delivery schedule.

4.8.2 Tools of Negotiation

The SWOT approach – (strength, weakness, opportunity, and threats)– is relevant to the project team. Suppliers corporate profile, the industry scenario,

national perspectives, international consideration, etc., will enable identification of the bargaining position of the supplier in the context of social / political / technological / financial / regulatory /economical/ natural environmental factors. Negotiations must be conducted in peaceful and comfortable surroundings without disturbance of any sort.

It is essential that the negotiating team must be familiar with the market situation, and possess thorough knowledge about the suppliers' expertise on technical, financial and manpower capabilities. It is not necessary to negotiate on each and every item/supplier. It is desirable to negotiate only with the lowest two or three tenders. The process of negotiation must be confined to high cost critical items. Techniques like ABC/VED analysis may be helpful.

Quantity discount analysis is used for simple comparisons while detailed analysis of cost breakdown into labour, material, overhead etc., are used for complex comparisons. The break-even analysis is also used for estimating the internal price structure and to obtain greater insight into the supplier's proposals.

The concept of learning curve of the labour cost going down with repetitive jobs may be used for repetitive labour intensive projects. Other techniques include persuasion, questioning, discussions, vertical thinking, prolonged silence, walk out etc., depending on the situations.

The important personal abilities and qualification for negotiation are: (i) knowledge, (ii) attitude, (iii) skill in Identifying the issues under negotiation and (iv) planning strategies and techniques to revolve these issues effectively by argument, persuasion and skills in communication.

4.9. Contractor's Obligations

Clauses headed "Contractor's obligations" cover general provisions such as:

- Obligation to construct the facility in accordance with the project specifications;
- Applicable standards and codes;
- Order of precedence of contract documents;
- Obligation of the contractor to request for additional information;
- Obligation of the contractor to check and verify company information;

- Occasionally, contractors may be required to assume liability for correctness and completeness of the information furnished by the client. As a principle this is not acceptable because it implies that a contractor is responsible for any mistakes made by the client;
- Obligation of the contractor to assume responsibility for scheduling progress reporting, forecasting, etc.;
- Obligation of contractors to work out detailed work package;
- Statement that the contractor is fully knowledgeable of site conditions and other local conditions (weather, access to site, etc.). Liability for subsoil conditions and other things that cannot be detected by simple visual check should be excluded.
- Obligation of the contractor to keep and to maintain the site clean;
- Obligation to inform the client of problems and other important matters affecting the Project in general;
- Anything not included in the client's information but that logically should have been included shall be deemed to be included.

4.10 Client's Obligations

The list of the client's obligations tends to be far shorter. Contractors should try to add an umbrella provision to the effect that anything not specifically included in the lump sum shall be deemed to be excluded (and thereby becomes reimbursable). When the client wants to review or approve certain drawings and information, an approval time of say 10 working days should be added, following which the drawings, etc., shall be deemed to be approved. Any client changes after those 10 days shall constitute a change in the order with price and time repercussions.

Clients are usually responsible for obtaining permits and other official authorizations, the supply of utilities (including construction utilities) and feedstock, telephone and other communications' facilities, canteen, toilets, fencing, guards, roads, lighting, storage facilities, warehouse, etc.

5. PROJECT PERSONNEL

Human resources are the vital resource of any entity. Projects need a diversified set of personnel for their operations. Without people around, the project remains a simple collection of bricks and barracks. However, the most

difficult aspect of managing project is the human part. As a matter of fact, the tools-of-trade (project management) are of dismal value if one cannot get people to make use of them. This emphasizes the role of interpersonal and human relations skills that a project head must possess to perform his duties diligently. The essential skills of a project leader while managing this subsystem are:

- influencing group members;
- negotiating with customers;
- communicating, directing, motivating and controlling the teams,

Project Manager

The project manager is the crux of the coordinating authority with various functional heads. He is the seminal coordinating authority forging a lasting rapport with the financial institutions, government and statutory bodies, etc. He is the main plank and fulcrum of the project and he is a person who has been associated with the project right from 'scratch to the completion' of the project. He plays role like a link-pin. He encompasses into his fold the whole gamut of the project team and also entire spectrum of clientele contractors and turnkey consultants. The foremost aim and motto of the project manager is to accomplish the project cost within the stipulated amount. Hence, it can be observed that the project manager plays a vital role in the firmament of industrial project.

Project Team

The project team comprises of section heads of production, electrical and mechanical who are looking after the activities of their respective wings. The project team is a *la* cricket team where we could find players for bowling, batting and fielding. With the result all the players would put their unstinted and indefatigable effort to accomplish the objective of the team. For any project, success could be attributed to the able support of all the players. The project manager would don the role of a captain of the cricket team or of a captain of a ship.

Project Consultants

Project management consultants are professionally qualified who are fully equipped to render services to the project management organization in the entire gamut of erection, commissioning and implementing the industrial projects. A delay in project consultant's performance of his job would mean procrastination

of the project, for which ultimately client suffers more than the consultant. He plays a vital role in the various stages of the project right from the stage of commissioning of the project. He is also abundantly responsible for closely monitoring the progress of the project at every phase of the project. The unstinted and unflappable support of the project consultants would naturally brighten the project's success.

Personnel Competence

The competence of project personnel is important factor that decides the success of the project. It has been the practical experience of the bank/financial institutions that even the most technically feasible and financially/commercially viable project has been a total failure because of lack of management competence. The problem may become all the more serious if the management is dishonest/delinquent rather than inefficient and ineffective. Unfortunately, there is no scientific yardstick by which managerial competence can be judged objectively.

Some of the other points that deserve careful consideration in this regard can be enumerated as under:

- Composition of board and the management set-up:
- In case the- unit is proposed to be set up with foreign collaboration, the standard and status of the collaborators in the international market.
- In case of existing undertaking, the existing state of industrial relations, i.e. rate of employee-turnover, parks and benefits available to the employees, workers' participation in management etc.,

Culture of an Organization

The culture of an organization is often defined as "we don't do it that way around here". To violate the cultural expectations of powerful members of an organization is to invite trouble. If an organization has been practicing "seat-of-the-pants" project management, adopting a formal, disciplined system, it requires a change in the culture of that organization. The organizational culture is a stirred effect of beliefs, values, attitudes, traditions, and behaviours of the members of the organization. To gain acceptance from all quarters, team members must see that there is some self interest rather than a penalty. It is

160

certainly time and cost incurrence on the planning episode which translates into fewer headaches later on.

Organization System

The coordination of people in a clear-cut way is possible only when there is an organization of people and their groups in a formal manner. This is labeled as 'organizational system' where the parameters are set for the authority, responsibility and accountability (the three-pronged attack) on the part of the performers. In the absence of this formal bondage among the members of the team of a project, the outcome is likely to be chaotic.

Questions:

1. What do you mean by the term 'project contracting'? Explain its significance.
2. Explain the basic principles of project contracting.
3. Briefly describe the 3 R's of contracting.
4. What is global tendering? Explain how it can be processed.
5. What is bidding and explain the bid evaluation process.
6. What is project negotiation? Explain its objectives.
7. Briefly narrate the tools of negotiation.
8. Explain the different types of pricing contracts.
9. What are the contents of tender documents?
10. Explain the significance of Project design.
11. Define Project organization and explain its importance.
12. Briefly describe different forms of project organizations.
13. What is matrix organization? Explain its significance.
14. Explain the merits and demerits of Divisional form of project organization.
15. What is Line and staff form of organization? Explain its merits.
16. Under which situation projectised organization will hold good?
17. Describe the prerequisites for successful project implementation?
18. What are the essentials of project net-working? Explain the uses of net-work diagrams.

19. Explain the importance of project personnel and their types.
20. Briefly state the issues of project implementation.
21. Activities in a Project, Duration and Employees needed per day for each activity and total number of employees needed for completion for each activity: are as under:

Activity	Days	Employees Needed		Activity	Days	Employees Needed	
	Needed	Per day	Total		Needed	Per day	Total
A – B	8	3	24	H – I	3	3	9
B – C	2	5	10	E – I	3	3	9
B – D	1	2	2	G – J	2	4	8
C – E	1	3	3	J – K	1	3	3
B – F	3	7	21	I – L	1	3	3
D – G	1	2	2	K – L	1	3	3
F – G	1	2	2	L – M	1	2	2
B – H	6	5	30	M – N	1	2	2

Construct the net-work diagram for the above project with as many details as possible.

* * *

163

UNIT – 5

PROJECT EVALUATION AND CONTROL

Syllabus Covered: Issues relating to Project Control- PERT and CPM – Time and Cost Monitoring – Project over-run- Performance Reporting – abandonment analysis.

OBJECTIVES

1. To examine the different aspects that need to be controlled in project execution
2. To discuss the role of PERT in project scheduling and control
3. To explain the concept and uses of CPM and its distinction from PERT
4. To deal with issues of project overrun
5. To explain the methods of monitoring time and cost overruns
6. To explain the role of performance reporting and the components of the same
7. To explain the concept and economics of abandonment analysis

Like any goal oriented activity, project need to monitored for their performance on an on-going basis, evaluation of performance on different parameters, like amount of *work completed, time consumed, cost incurred and critical stages* reached, against *work that ought to haven completed, the targeted time, the budgeted cost and mile-stoned critical* stages. Any mal-functioning need to be spotted, causes identified and correction done so that there is no cascading effect current lags over future courses and final completion of project.

1. PERT and CPM

PERT and CPM are important net-work tools that are very much used in project management.

1.1. Pert application in project

PERT is a network technique developed in the 1950s by the US Navy Special Projects Office in planning and controlling the Polaris Missile

Programme. That was a massive project with 250 prime contractors and 9000 subcontractors. You can now imagine the diverse activities, their scheduling and integration, the monitoring and controlling tasks involved. A comprehensive PERT could be of great help in such major tasks. Even smaller projects involve diverse activities requiring the use of PERT. PERT assumes uncertainty and that three time estimates are made and using the beta distribution expected completion times activities are computed.

PERT is capable of giving answers to the questions like:

i) When will the project be completed?
ii) When is each individual part of the project scheduled to start and finish?
iii) Which parts of the project be finished on time to avoid delay in completion of the project?
iv) Is it possible to transfer resources from non-critical parts (i.e., those which can be delayed) to the critical parts (i.e., those which have to be completed on time so as not to delay the project completion)? And
v) The activities on which the management should concentrate its efforts at any one time?

1.2. Concept and Nature of CPM

CPM (Critical Path Method) is a companion of PERT. This assumes certainty and that one estimate of time is made. The CPM was originally developed by DU Pont company of the US in order to facilitate the control of its large, complex industrial projects. Critical Path is that `path' or `route' of the project which takes the longest time. The completion of the project therefore depends on the completion of each activity falling in the critical route. Both PERT and CPM involve finding the critical path and using the same for decision making.

Comparison of PERT and CPM: CPM and PERT are more or less same techniques. The differences between them are: In CPM only one estimate of time of completion for an activity is made, whereas in PERT, three estimates are made (already referred) and the expected time worked out. CPM is more effective when repetitive processes are involved, where as PERT is useful where non-repetitive works are involved. CPM is more effective when required time for completion is known with certainty, while PERT is more effective when the time for completion is not known with certainty. But, in practice these

164

differences are ignored out. And network technique has become a common reference to both PERT and CPM, as patently the two are same and their applications are similar.

1.3. Construction of a Network

A description of how to construct a network is presented. A network contains connected `events' and `activities'. `Event' refers to the `starting' and `completion' of specific jobs. The `circles' in the network, indicate the `events'. Otherwise, the circles are known as `nodes'. `Activity' refers to progress of work leading from one `event' to other `event'. This is indicated by the `arrows' in the network. When drawing a network physical neatness, avoiding criss-cross moves, and left to right projection are needed. Further, `loops' must be avoided. A `loop' results when two activities have the same `start' and `end' nodes or events. In such a case, a `dummy' activity, with time zero as well as resource need zero, is introduced to avoid a loop. Now, the network for the car project is attempted.

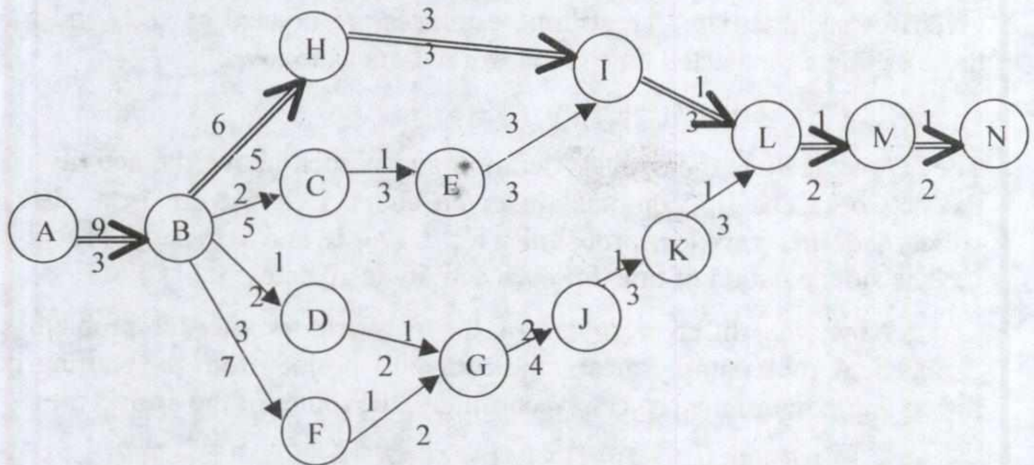
Illustration: 1 Table 1 gives the activities involved in a project, say the manufacture of cars. The days and employees needed for each activity per day and total number needed for completion of each activity are also given. We can draw the net-work and find the paths and the critical path.

Table 1 : **Activities in the Project, Duration and Employees needed per day for each activity and total number of employees needed for completion for each activity:**

Activity	Days Needed	Employees Needed		Activity	Days Needed	Employees Needed	
		Per day	Total			Per day	Total
A – B	8	3	24	H – I	3	3	9
B – C	2	5	10	E – I	3	3	9
B – D	1	2	2	G – J	2	4	8
C – E	1	3	3	J – K	1	3	3
B – F	3	7	21	I – L	1	3	3
D – G	1	2	2	K – L	1	3	3
F – G	1	2	2	L – M	1	2	2
B – H	6	5	30	M – N	1	2	2

Figure 1 gives the net-work diagram for the above project.

Figure 1: NET WORK DIAGRAM



A brief description is presented on the network in fig 1. Node or event A is the starting point. Node B indicates the completion of say the `design' work. A-B, therefore indicates the progress of design activity, which needs 8 days for completion 3 employees per day. The number of days needed for an activity is written above the arrow, while number of employees or any resource or combination of resources needed written below the arrow of the activity concerned. Thus the numbers above and beneath the

The numbers above and below the arrows indicate the time required and employees required for completion of respective activities. Until design A-B, is completed activities B-C, B-D, B-F and B-H cannot be taken up. Hence, all these activities have common start node, viz. B. Activity G-J cannot be taken up, until activities D-G and F-G are over. So activities D-G and F-G converge at `G' and so on. No dummy activity is needed for the project.

1.4 Time Estimates

In the problem relating car project network, dealt first by us, only one time estimate is given for each activity. But in PERT, usually, pessimistic (longer), optimistic (shorter) and most likely (via media) time estimates are given for each activity. These time estimates are notated as t_p, t_o and t_m. From these estimates, expected time (t_e) is worked out as follows:

$$t_e = (t_p + 4t_m + t_o)/6$$

The `$t_e$' is taken as the activity duration and written above the activity arrow in the network. The `t_e' computation given above is based on `beta' distribution which underlies very low probability for, t_o and t_p and very large probability for t_m. The std. deviation of time for each activity is given by: $(t_p - t_o)/6$.

Now, the different routes of the network for the 1st problem can be deduced. A route simply means the course of project from the starting point to the ending point of the project. Accordingly, the routes of the project are:

Route I: A - B - H - I - L - M - N

Route II: A - B - C - E - I - L - M - N

Route III: A - B - D - G - J – K - L - M - N

Route IV: A - B - F - G - J – K - L - M - N

The time duration of the different routes can be worked out by adding together the time duration of individual activities falling in the respective routes. Accordingly,

Route I involves : 8+6+3+1+1+1 = 20 days

Route II involves : 8+2+1+3+1+1+1 = 17 days

Route III involves : 8+1+1+2+1+1+1+1 = 16 days

Route IV involves : 8+3+1+2+1+1+1+1 = 18 days

The longest route is: A - B - H - I - L - M - N, which takes 20 days. This route is called the critical path. The network diagram represents the critical path by thick arrows or double line arrows, just to indicate the critical path prominently.

The time required for completion of the project is given by the time duration of the critical path. If everything goes well, by end of 20th day the new model car would be ready. For this to happen, each activity in the critical path has to be taken up and completed as per schedule. That is, `B' must be over by

the 8th day, H must be commenced on beginning of 9th day and completed on 14th day, I to begin on 15th day and completed by 17th day, L to begin on 18th day and completed on the same day, M to begin on 19th day and completed on the same day and N to begin on 20th day and completed on the same day.

1.5 Time Computations and Float

Now the concepts of earliest start time (EST), earliest finish time (EFT), latest start time (LST), latest finish time (LFT), slack, total slack and free slack may be presented.

EST refers to when a particular activity can be taken up at the earliest. Activity A – B has to begin at day O and will go till the end of day 8. Activity B -D. B -F, B-H and B-C can be taken up immediately after A-B is over, i.e. from end of day 8. (i.e. the beginning of day 9) So, the EST for B-D, B-F, B-H and B-C is end of day 8. B-D will be over by end of day 9 and that the EST for D-G is end of day 9 (i.e. the beginning of day 10). The EST for G-J is not however end of day 10, by which time D-G will be over. Because, G-J cannot be commenced until F-G is also completed. F-G will be over by end of day 12. So, for activity G - J the EST is end of day 12 or beginning of day 13 and so on.

EFT refers to when a particular activity can be completed, assuming it has been commenced as per its EST. For A-B it is end of day 8, for B-D it is end of day 9, for B - F it is end of day 11 and so on. For G-J the EFT is end of day 14. Simply the EFT = EST + Activity time.

LST and LFT are computed backwards from last activity, viz., M-N in this project. M-N must be over by end of day 20. So, its LFT is end of day 20. Its LST is end of day 19, so that by end of day 20, it will be over and the project completed by day 20. If you go backward, for activity L-M the LST is end of day 18 and LFT is end of day 19.

Table 2 below gives the EST, EFT, LST and LFT for the various activities of the car project we dealt at first.

168

Table 2 : EST, EFT, LST AND LFT

Activity	EST	EFT	LST	LFT	Total slack (LFT - EFT) or(LST- EST)	Free Slack/Float
A-B	0	8	0	8	0	0
B-D	8	9	12	13	4	0
D-G	9	10	13	14	4	2
B-F	8	11	10	13	3	0
F-G	11	12	13	14	1	0
G-J	12	14	14	16	2	0
J-K	14	15	16	17	2	0
K-L	15	16	17	18	2	2
B-H	8	14	8	14	0	0
H-I	14	17	14	17	0	0
B-C	8	10	11	13	3	0
C-E	10	11	13	14	3	0
E-I	11	14	14	17	3	3
I-L	17	18	17	18	0	0
L-M	18	19	18	19	0	0
M-N	19	20	19	20	0	0

Slack or float refers to the extent an activity can be delayed without affecting completion of the project on time. This is given by LST-EST or LFT-EFT. Table2 gives this also under total slack column. You will note that activities falling on the critical path have no slack. Because, none of the activities can be delayed, lest project duration will increase. There are two concepts of slack: total slack and free slack. Total slack is simply LST - EST or LFT - EFT. Free slack refers to slack or spare time available for an activity when all succeeding activities in the network can be started at their respective EST. Only three activities D-G, K-L and E-I have free slack.

Early start schedule and Late start schedule

Scheduling of non critical activities can be done by two schedules:

Early start schedule

Late start schedule

Early start schedule refers to the schedule in which all activities start as early as possible. In this schedule

a) Are events rear at their earliest because all activities start at their earliest starting time and finish at their earliest finishing time.

b) There may be time lags between the completion of certain activities and the occurrence of events which these activities lead to, and

c) All activities emanating from an event begin at the same time.

The early start schedule: It suggests a cautious attitude towards the project and a desire to minimize the possibility of delay. It provides a greater measure of protection against uncertainties and adverse circumstances. Such a schedule however, calls for an earlier application of resources.

The late start schedule : It refers to the schedule arrived at when all activities are started as late as possible. In this schedule,

i) all events occur at their latest because all activities start at their latest starting time and finish at their latest finishing time

ii) some activities may start after a time lag subsequent to the occurrence of the proceeding events

iii) all activities leading to an event are completed at the same time.

The late start schedule reflects a desire to commit resources late as late as possible. However, such a schedule provides no elbow room in the waste of adverse developments. Any unanticipated delay results in increased projects duration.

In real life projects the activities run into hundreds and there may be several constraints. The problem of scheduling in such cases tends to become very complex. For solving such problems the technique of linear programming can be used. However, when a problem has numerous activities, say more than 100, the techniques of linear programming becomes computationally unwisely and inordinately expensive, even with the aid of the fastest computers available.

In view of the practical difficulties in using linear programming for solving large-scale scheduling problems, heuristic program have been developed.

1.6 Uses of Network Techniques

PERT and CPM techniques have become useful to management in many ways. These are:

The graphic representation of how each activity is dependent on others helps in better scheduling, monitoring and control of project activities.

To prepare the network itself considerable planning, analysis and in depth evaluation of the whole project are needed, which in turn help in better execution of the project.

Network techniques can serve as indicators of bottlenecks and potential trouble spots and this helps in effective preventive handling of pitfalls so that the project progresses well as per original plans.

Network diagram illustrates the type and extent of co-ordination required among several functionaries of the project term, viz., designers, managers, contractors and others.

Network diagram helps in identifying critical tasks and thereby helps diversion of resources to them so that they are not lagging behind schedule.

Network diagram helps in identifying critical path, which may be changing a number of times as time estimates prove inaccurate. So the critical path has to be identified every time estimates are changed and this is easily done with the help of the network.

Network techniques help in resource allocation. Resources such as Labour and machine can be better allocated to project activities with the help of a network analysis.

Network techniques help in resource smoothening. That is, when resource requirement are uneven over time, a sort of smoothening or leveling is required. PERT and CPM are useful in this regard.

Network techniques help in ascertaining whether or not it is advisable to crash project time and the impact of crashing on cost of the project. What

activities have to be speeded up so as to minimize cost escalation on account o: crashing are known with network analysis.

Network techniques help in cost control too. Starting works by the LST could help in lock up of capital for a less period than when works are started off by their EST. This is a cost control exercise facilitated by network analysis.

1.7 Resource Allocation and Resource Leveling through Network

PERT and CPM techniques are not simply static techniques involving the computation of times, EST, LST, EFT, LFT and drawing the diagram. It is a dynamic tool. It helps in resource allocation and resource leveling.

Resource allocation means how much resources be diverted to the project concerned day after day as the project progresses. In table- 1, the number of workers required for each activity for the project concerned is given. With that information, we can compute what is the human resource requirement day afte day.

The resource requirement depends on when the activities are scheduled to begin, i.e., as per their EST or LST or any intermediary time. Suppose as per EST the activities are scheduled. Then the human resource needs would be as in table-3. You know in the first eight days only A-B will be taken up requiring everyday 3 labours. On the 9th day B-C,B-D,B-F and B-H can be taken up requiring a total of 19 labours and 'B-D' is completed that day. On the 10th day B-C,B-F & B-H are in progress, D-G got added and completed and ' B-C' is over by end of day 10. On the 11th day C- E, B-F and B-H are in progress and C-E &B- F are over by end of the day. On 12th day 'F-G' is taken up as both the proceeding activities B-D &B- F are over by now . And so on as you see in Table - 3.

From table -3, You know how much labour is required on day - to day basis, (see last column) and you know how much is required activity -wise (see last row). You can now make allocations of human resources to the project. In the same way, you can find what would be the day-to-day labour needs when the works are scheduled as per their LST.

Table 4 gives the same. You know how much labour is required on day - to day basis, (see last column) and you know how much is required activity - wise (see last row). You can now make allocations of human resources to the project.

Between 9th and 18th days, there are differences in the daily needs under the two patterns of job scheduling. During the period 1st - 8th day only one critical activity is in operation and during 19 - 20th days too only critical activities are operated. So, under both scheduling patterns the labour needs are same But in the intervening 9^{th} 18^{th}days there are differences. (please read the tables 3 and 4 given below.)

Day	9	10	11	12	13	14	15	16	17	18
EST (Employee Needed)	19	19	15	10	12	12	6	6	3	3
LST (Employee Needed)	5	5	12	17	19	12	10	10	9	6

Now depending on the availability of resources, slack times , certain resource leveling exercises can be done.

Resources leveling means evening out the daily resource needs to the extent possible. You find that under the EST scheduling the labour needs on 9th through 18th days are respectively 19, 19, 15, 10, 12, 12, 6, 6, 3 and 3 persons and under the LST scheduling, labour needs are 5, 5, 12, 17, 19, 12, 10,10, 9 and 6 persons per day respectively for the different days. The daily needs are highly varying. Certain leveling or smoothening or reducing the variations in daily needs can be attempted. That is what is called as resource leveling. Why is leveling needed? The reasons are : (i) Resource constraint can be one of the reasons. Say, not more than 12 persons are available on any one day, whereas we need as much as 19 persons per day on few days. By rescheduling non-critical activities using their slack times, the above purposes can be served. (ii) Practically speaking, too much needs on some days and too little needs on other days are not signs of good planning. (iii) Also, disruption in work is more probable when the peaks and through in resource needs are not ironed out. (iv) Optimum utilization of permanent / owned facilities, avoiding ideal time, is possible with resource leveling exercises.

Table 3: EST based work scheduling and day-wise, activity-wise resource needed

Days	*A-B*	*B-C*	*B-D*	*C-E*	*E-I*	*B-F*	*D-G*	*B-H*	*H-I*	*F-G*	*G-J*	*J-K*	*K-L*	*I-L*	*L-M*	*M-N*	*Total Labour needs*
1	3																3
2	3																3
3	3																3
4	3																3
5	3																3
6	3																3
7	3																3
8	3																3
9		5	2			7		5									19
10		5				7	2	5									19
11				3		7		5									15
12					3			5		2							10
13					3			5			4						12
14					3			5			4						12
15									3			3					6
16									3				3				6
17									3								3
18														3			3
19															2		2
20																2	2
Total labour days/ activity	24	10	2	3	9	21	2	30	9	2	8	3	3	3	2	2	133

Say in our case only 12 labours are available on any one day. Is it possible to complete the project on time with only 12 persons? May be some rescheduling can be thought of. The method adopted here is called as `heuristic programming'. `Heuristic' means `rule of thumb' that works and a collection of these rules is known as `heuristic programming'. One approach of heuristic programming is rescheduling activities that have larger slack time.

A resource leveling is suggested here.

Table 4: LST based work scheduling and day-wise, activity-wise resource needed

Days	*A-B*	*B-C*	*B-D*	*C-E*	*E-I*	*B-F*	*D-G*	*B-H*	*H-I*	*F-G*	*G-J*	*J-K*	*K-L*	*I-L*	*L-M*	*M-N*	*Total Labour needs*
1	3																3
2	3																3
3	3																3
4	3																3
5	3																3
6	3																3
7	3																3
8	3																3
9								5									5
10								5									5
11						7		5									12
12		5				7		5									17
13		5	2			7		5									19
14				3			2	5		2							12
15					3				3		4						10
16					3				3		4						10

17					3				3			3					9
18													3	3			6
19															2		2
20																2	2
Total labour days/ activity	24	10	2	3	9	21	2	30	9	2	8	3	3	3	3	2	133

1.8 Network Technique in Project Scheduling

Network Technique is predominantly used in project scheduling. When will each activity be commenced, when the same has to be completed, which activity can be delayed, when will the project be completed and related questions are answered by PERT and CPM techniques. All these require time estimates and sequential relations between jobs.

Time estimates are made based on past experience, the job nature and availability of resources. In PERT, 3 estimates of time for each activity is made as was already stated and the expected time worked out using a formula already dealt with. This is needed since PERT deals with uncertain business environment. In CPM only one time estimate is made as it assumes certainty condition. But estimates may be revised in both the cases as inaccuracies in past estimates come to light.

The sequence of operations is to be known thoroughly. This is crucial to project scheduling. Again experience and thorough knowledge of the activities of the project help in setting up the sequence.

Once time estimates and sequential relations are known activities scheduling can be prepared. You have to find out EST, EFT, LST, LFT, total slack and free slack. All these have been already explained. Then activities can be taken up as per their EST or LST or some in-between times taking advantage of slack of activities. Of course, for critical activities EST and LST are same; also EFT and LFT are also same. That is, they have no slack.

Under PERT we can find the probability of finishing a project by certain date. For this we need to know the standard deviation of activity times for critical activities. Std. deviation in the case of activity times is given by: $(t_p - t_o)/6$. This formula again is unique to beta distribution. Calculate the std. deviation for each of the critical activities. Square each of the std. deviation figures. Add the squared figures. Take square root for the summated figure. This is taken as the project std. deviation of the earliest finish time. And `Z' is calculated as follows:

$$z = \text{Std. normal variate} = \frac{\text{Due date - Expected date of completion}}{\text{Project Std. deviation}}$$

Corresponding to the `Z' obtained, from the normal distribution table `area' under normal curve is found. From that figure, the probability of completion by the due date is known.

We may find the probability of completion by 22nd day from commencement for our car project, given the expected completion by 20th day as per the critical path. We need to know the three time estimate for the critical activities which are as follows and three time estimates be as under in table 5.

Table 5 : Critical activities and time estimates

Activity	T_p	T_m	T_o	$(T_p - T_o)/6$
A-B	10	9	2	(10-2)/6=4/3
B-H	9	4.5	3	(9-3)/6=1
H-I	5	3	1	(5-1)/6=2/3
I-L	5	3	1	(5-1)/6=2/3
L-M	5	1.5	1	(5-1)/6=2/3
M-N	5	1.5	1	(5-1)/6=2/3

$$\text{Std. deviation of project} = \sqrt{(4/3)^2 + (1)^2 + (2/3)^2 + (2/3)^2 + (2/3)^2 + (2/3)}$$

$$= \sqrt{\frac{16}{9} + 1 + \frac{4}{9} + \frac{4}{9} + \frac{4}{9} + \frac{4}{9}}$$

$$= \sqrt{\frac{41}{9}} = \frac{6.4}{3}$$

$$\text{Z variable} = \frac{\text{Due date - Expected date}}{\text{Project std. deviation}}$$

$$= \frac{22-20}{6.4/3} = \frac{2 \times 3}{6.4} = \frac{60}{64} = 0.9375$$

Area under normal curve corresponding to Z = 0.9375 is equal = 0.825. That is, there is a probability of 0.825 or 82.5% that the project would be completed by 22nd day.

The probability computation is helpful in project rescheduling, if need be. Where the `P' is very small, there is need for speeding up the work through commissioning more resources or in postponing the due date. Hence the use of PERT and CPM in project scheduling.

1.9 Time-Cost Optimization

Sometimes a project has to be completed sooner than the planned time. In our case the project duration is 20 days. Say, you want to complete the project in 15 days for some pressing reason. Can you? May be you can. By commissioning extra resources you may be able to achieve this. Why extra cost arises? May be you have to work overtime incurring double the normal cost per time. May be you have to hire additional facility paying more than normal hire charges.

Table 6 gives the normal time and cost and crash time and cost for the activities of a project. Based on this on the last column crash cost per day is given.

Table 6 : Normal and Crash Time/Cost

Activity	*Normal*		*Crash*		Cost to reduce per day
	Time (days)	*Cost Rs.*	*Time (days)*	*Cost Rs.*	
A-B	8	24,000	6	30,000	3,000
B-C	2	10,000	1	11,000	1,000
B-D	1	2,000	0.5	6,000	8,000
C-E	1	3,000	0.5	6,000	6,000
B-F	3	21,000	2	22,000	1,000
D-G	1	2,000	1	2,000	--
F-G	1	2,000	1	2,000	--
B-H	6	30,000	4	36,000	3,000
H-I	3	9,000	2	15,000	6,000
E-I	3	9,000	3	5,000	--
G-J	2	8,000	1	9,250	1,250
J-K	1	3,000	0.5	6,000	6,000
K-L	1	3,000	0.5	6,000	6,000
I-L	1	3,000	0.5	6,000	6,000
L-M	1	2,000	0.5	4,500	5,000
M-N	1	2,000	1	2,000	--
		1,33,000		1,66,750	

The normal cost is Rs. 1,33,000 and the crash cost is Rs. 1,66,750. But, you can complete this in 16 days, at a cost of Rs. 1,45,000. How? You have to proceed methodically :

(i) Find those activities in the critical path (or paths) where time can be cut substantially with minimum extra rupees spent. The goal is the greatest reduction in project time for the least increase in project cost.

(ii) You have to work out the cost of crash per day for each activity.

Crash Cost Per Day = (Crash cost - Normal cost) / (Normal time - Crash time)

Crash Cost Per Day for activity AB = (30000-24000)/ 8-6 = 3000
Crash Cost Per Day for activity BC = (11000-10000)/ 2-1 = 1000 .

Similarly for all activities the same are calculated.

Some activities could not be crashed at all as you see from the table and some activities need not be crashed. It is a must that critical activities alone are crashed if crashable and if needed only.

Route-I is the original critical path. Activity M-N cannot be crashed. And only activities A-B, B-H, H-I, I-L and L-M can be crashed and the crash cost per day works out to Rs. 3000, Rs. 3000, Rs. 6000, Rs. 6000 and Rs. 5000 for these activities respectively. We take up the least crash-cost-per-time-activity. A-B or B-H is our choice. Say you take 'B-H' for crashing fully. Two days you save now and extra cost is Rs. 2 x 3000 = Rs. 6000. Now route I and route IV are critical as both have 18 days duration. To cut project duration you have to reduce the duration of both routes. By crashing A-B the duration gets reduced to 16 days and the additional cost is Rs. 6000. So, after crashing by 4 days the project involves an additional cost of Rs. 6000 + 6000 =12000 and in all costs Rs. 1,45,000.

2. TIME MONITORING – Other Tools

For monitoring the time aspect of the project, the efforts should be taken

1) Conduct appreciation programme for the contractor
2) Development of project execution plan and overall project implementation schedule
3) Preparation of special condition of contract for scheduling and monitoring by work package contradictions.
4) Evaluation of bids in relation to scheduling and monitoring

5) Appearance or review the detailed schedules and progress reports submitted by vendors and contractors.

6) Reviews with owner, consultants, contractors and vendors

7) Project audit and corporate review

8) Monthly progress report to the owners.

9) Installation and operation of an on-line information system

10) On the job training for on-going scheduling and monitoring to the monitoring agency.

So schedule control is to ensure adherence to the agreed time schedule for the project. Monitoring and control of project and time, therefore becomes essential to ensure adherence to project schedule.

A heuristic approach is a rule of thumb like schedule critical activities first or schedule the activity which has the largest independent float in the end. A heuristic program consists of a collection of such heuristics. In recent years many heuristic programs have been developed. They are formulated usually as computer programs. These programs may be broadly divided into two types resources leveling programs and resource allocation programs. A resource leveling program seeks to level resource requirements given a constraint on project duration. A resource allocation program tries to find the shortest project schedule, given fixed resource availability.

3. COST MONITORING SYSTEM

A well disciplined management cost control system (MCCS) will produce the following results.

1) Policies and procedures that will provide timely information on cost and work

2) Systems to minimize distortion reporting

3) Strong management emphasis on meeting commitments

4) Weekly term meetings with a formalized agenda, action items and minutes.

5) Top management periodic review of the technicai and financial status.

6) Simplified internal audit for checking compliance with procedures.

Effective management of a progress during the operative cycle requires that a well-organized cost and control system be designed, developed and implemented so that immediate feed back can be obtained, whereby the up-to-date usage of resources can be compared to target objectives established during the planning cycle.

3.1 Requirements of effective control system

The requirements for an effective control system (for both cost & schedule performance) should include:

a) Thorough planning of the work to be performed to complete the project

b) Good estimating of time, labour and costs

c) Clear communication of the scope of required tasks

d) A disciplined budget and authorization of expenditures

e) Periodic re-estimation of time and cost to complete remaining work

f) Frequent, periodic comparison of actual progress and expenditures to schedules and budgets, both at the time of comparison and at project completion.

Management must compare the time, cost and performance of the progress to the budgeted time, cost and performance, not independently but in an integrated manner. The first purpose of control therefore becomes a verification process accomplished by the comparison of actual performance to date with the predetermined plans and standards set forth in the planning phase. The comparison serves to verify that:

Objectives have been successfully translated into performance standards

Performance standards are in fact, a reliable representation of progress, activities and events.

Meaningful budgets have been established such that actual Vs. planned comparisons can be made. In other words, the comparison verifies that the correct standards were selected and that they are properly used.

The second purpose of control is that of decision making. Three useful reports are required by management in order to make effective and timely decision:

The project plan, schedule & budget prepared during the planning phase.

182

A detailed comparison between the resources expanded to date and those predetermined. This includes an estimate of work remaining and the impact on activity completion.

These reports are then supplied to both the managers and the doers. Three useful results arise through the use of these reports, generated during a thorough decision – making stage of control.

Feedback to management, the planners and the doers is a must to foretell them work progress and cost involved.

Identification of any major deviation from the current program, plan, schedule and budget is a must for corrective action.

The opportunity to initiate contingency planning early enough that cost, performance and time requirements can undergo corrective action without loss of resources.

These reports, if properly prepared provide management with the opportunity to minimize downstream changes by making proper corrections here and now.

The management cost and control system (MCCS) takes on paramount importance during the operating cycle of the project. The operating cycle is compared of four phases:

Work authorization and release (Phase II)

Cost data collection and reporting (Phase III)

Cost analysis (Phase IV)

Reporting: Customer and Management (Phase V)

These four phases, when compared with the planning cycle phase I constitute a closed system, network that forms the basis for the management cost and control system.

3.2. Cost control methods during different phases of project

The methods that can be used at different stages of the project for cost control are given below:

At zero date: On the basis of the finalized basic package, an itemized control estimate is prepared. Using the network plan, the control estimate is converted into cash flow plan and annual/quarterly budgets. The control estimate and the

budget provide onward control of commitment on expenditure. Further, when time aspect of fund flow and commitments are kept under control with the help of budgetary restrictions, the interest burden for the projects gets reduced.

During detailed Engineering: Value engineering review should be carried out during the following stages of engineering development:

Overall project plan
Specification of plant and machinery
Utility systems design
Building design
Standard specifications and drawings

Value engineering is a systematic analysis and evaluation of the techniques and functions in the various spheres of an organization with a view to exploring channels of project execution improvement so that the value of a particular phase can be bettered. Value engineering aims at cost reduction. Value engineering probes into economic attributes of value and increases the productivity, thereby achieves cost reduction.

Generally the concept value engineering is applied to direct costs , that is, direct materials direct labour and direct overhead. Value engineering is mainly used at the design and development stage of the project itself. The efforts being directed at the stage of design review from all angles is termed as value engineering.

A value engineering review uses costs as the basis of review and ensures that value is included in the design. In this process, the cost of the item can be brought down without compromising the essential performance the value goes up.

It can be note that much benefit can be obtained with vary little effort when value engineering is applied at the early stage of the project. Through systematic value engineering, it is claimed that 10-20% of the project cost can be easily reduced. The major part of this saving can come from value engineering review of the basic engineering review. Whatever be the stage, value engineering has to deal with function and cost. The cost of each function will be worked out by estimating the cost of each work package. When the cost of each function is expressed as percentage of the total project cost and also compared wherever possible with the industry average the cost- worth-gap in each package

184

and therefore, opportunity of value improvements gets established. This helps to find out design alternatives by using various study and other creative techniques.

Thus the essence of value engineering is to identify unnecessary cost and then eliminates it. The methodology of value engineering requires a cost function visibility. The range and depth of visibility will vary depending on the state of project development. But when ultimately will ensure an improved value are the ideas which unfortunately be produced mechanically like the function cost work analysis.

During procurement and sub-contracting: After engineering the next important phase for cost reduction is procurement. Normally, competitive bids are acceptable item at the lowest cost. But competitive bidding alone will not ensure procurement at lowest cost unless the following steps are taken in addition to competitive bidding.

Vendor association in specification
Detailed scope and specification
General conditions of contract
Purchase procedure
Delivery is erectable sequence
Competitive bidding

During construction: There is not much scope for cost reduction during construction. However, there are certain as listed below on which close control must be exercised for keeping cost down.

Extra items
Idle charge, inventory cost, cash flow planning
Cost of operating staff and administrative expenses

Cash flow projection: Cash is required when construction is in progress. Purchases and consumption of materials, equipment, etc drain cash. The contractors will also raise monthly running bills. Cash requirements must correctly be assessed and arranged adequately. Fund shortage will not only slow down work but also attract additional costs. Other provision of fund will unnecessary keep fund idling, thus resulting in excessive interest burden. To make cash flow projection, a probable cash flow statement may be prepared at different point of time periods.

Cash flow projection/forecast showing the sources and uses of cash (money) on a rolling period basis is necessary. The inflows would typically be revenues from sales of products, sale of fixed aspects, issue of shares and loans, out flows would be costs incurred requiring payments to creditors, purchase of fixed assets or investments etc. budgeted, cash flow must be made along with the control flow.

The difference between budget and actual for each period is known as variance. Analysis of the period and cumulative variance provide a control mechanism helping to ensure that each expenditure and commitments are not allowed to rise above the projects ability to provide the funds from its operations.

3.3. Ten commandments of cost control:

Effective cost control depends on the following factors.

1. Realistic estimates
2. Maintain contingencies
3. Cost forecasting
4. Dealing with variances
5. Pricing the project
6. Management of inventory
7. Effective designing
8. Working capital management
9. Monitoring and control of costs
10. Information management

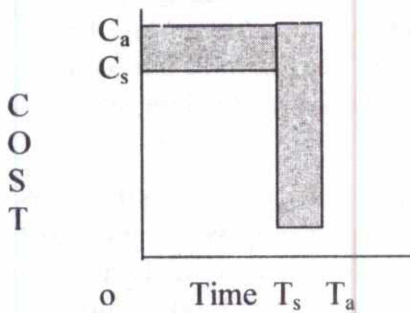
4. PROJECT OVERRUN

Project overrun means that the project exceeds all or most of the parameters of inputs for completion of the major phases or the whole of the project. Over-run means over-use of resources. We can define overrun as " inability of the project administration to complete the venture within the stipulated framework of cost and time. The inability is attributable to internal or external factors is another matter".

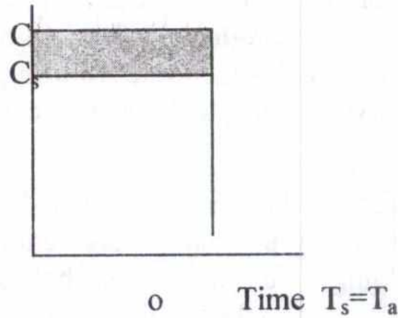
Time overrun simply refers to spending more time on a project than scheduled for it. Cost overrun is the excess of actual cost incurred on a project over the budgeted or planned cost.

The time and cost overrun has been depicted in the diagrams

Both Over-runs



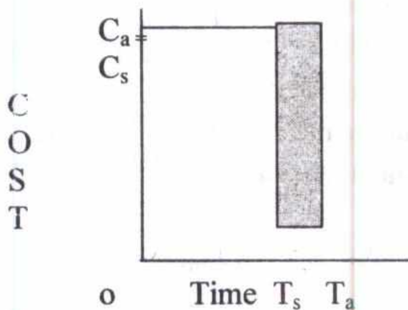
Cost Over-run only



C_a = actual cost $\quad$ C_s = schedule cost

T_s = Scheduled time $\quad$ T_a = Actual time

Time Over-run only



4.1. Causes for overrun

The reasons for overrun require a close scrutiny and in many cases the institutions may have to take certain decisions depending upon the merits of the case which may be considered unpleasant by the management.

As indicated above the reasons for time and cost overrun may be broadly classified into:

i) Internal

ii) External

4.1.1 Internal Causes

We may first examine the internal reasons which are basically controllable. Given a competent management the project can be implemented within the stipulated time limit and to cost estimates, if external factors aren't involved. We also assume that the time overrun itself it an important reason for the cost overrun. The rationale for this is too obvious to require any further explanation. Time has value and all cost estimates are valid within a given time framework.

Firstly, the cost overrun is the natural outcome of the **cost under-estimation** at the project preparation and evaluation stages. The principal motivation for this willful cost underestimation is to keep the promoters' contribution, about which the institutions have somewhat inflexible norms, to the minimum possible. Once the project financing is tied up, the promoters find themselves in a more favourable position to express there inability to contribute substantially to the overrun.

Secondly, there may be a ***change in the project concept*** as such during the implementation stage, viz., unsuitability of the location, changes in the designs of civil structure, additions/changes in the various items of plant and equipment following certain alterations in process technology, size of operation, product mix etc. Most of these points would be further elaborate when we discuss the technical problems at the project implementation and operation stage.

Thirdly, effective project implementation require competent management with ability to forecast problems and take corrective steps. The business environment is always in a flux. Prices are changing the availability of inputs at the constructional stage poses problems. Human resources are to be organized and assigned specific duties for timely action in various areas of implementation. Any ***management which is incapable*** of performing these tasks efficiently would be saddled with a cost overrun. This incompetence whether it systems out of fictional fights or genuine incompetence gives rise to a number of problems.

Fourthly, the tendency of the management to ***overspend on travel, entertainment, non-productive activities,*** etc. can easily distort the initial cost estimates. Some control over expenditure, internal or institutional, is desirable to keep the over run within manageable proportions.

Fifthly, ***incompetent and dishonest management*** can add to the overrun through underhand dealings in the purchases of construction materials and equipment.

Lastly, there are number of other reasons such as ***delay in the recruitment*** of essential project implementation staff, excessive expenditure on foreign techniques, failure to comply with institutional conditions, inadequate contingency provisions for non-firm items, involvement with a new / complex technology, siphoning of funds, lack of experience on the part of promoters in project implementation, etc.

4.1.2 External reasons

As far as uncontrollable external factors are concerned, they generally fall in the following broad categories:

1) Delays in the availability of utilities more particularly power
2) General short supply of materials and the consequent escalation in prices.
3) Delays in the sanction and disbursement of assistance by the financial institutions.
4) Delays in the development of an industrial area and provision of necessary infra-structure.
5) Changes in government policies, especially with regard to industrial and import licensing, foreign collaboration approvals and the actual time taken in obtaining these approvals.
6) Foreign currency fluctuations to the detriment of the importer.
7) Unforeseen political developments and the consequent delays in the receipt of imported equipment.
8) Inability of the domestic machine suppliers to adhere to the delivery schedules due to overbooking, strikes, non-availability of components/raw materials etc.
9) Delay in the arrival of foreign technicians.
10) Sudden changes in the market conditions thereby dampening the enthusiasm of the promoters to go ahead with the project implementation as scheduled originally.

4.2 Stage-wise causes of overrun in Project Life Cycle

These reasons may be classified through stages of life cycle of the project.

At ***conceptual stage*** overrun problem may be due to failure to understand basic requirements of a project, unrealistic appraisal of in-house capabilities and underestimating time requirements.

At the ***planning stage*** the reasons may be of omissions, inaccuracy of the work break down structure, misinterpretation of information, use of wrong estimating techniques, failure to identify and concentrate on major cost elements anu also due to failure to assess and provide for risks.

Under ***negotiating stage***, overrun may arise due to forcing a speedy compromise of agreements, procurement ceiling costs, negotiation team that must win this one.

Under ***contractual stage*** contractual discrepancies, proposal team different from project team, etc may causes overrun problem.

In ***designing stage***, accepting customer request without management approval, problems in customer communication channels and data issues and also due to problems in design review meetings.

Similarly under ***construction stage*** overrun may arises due to excessive material costs, overboard specifications, manufacturing and engineering disagreements.

4.3 Impact of cost and time overrun

The following consequences are inevitable flow from over-runs:

1) Increases in pre-operative expenses, mainly interest during construction
2) The enterprise's inability to repay principal and interest as per the amortization schedule.
3) Adverse impact on the viability of the project
4) Loss on account of lost market opportunities
5) Sickness at birth and a host of other unsavory consequences associated with industrial sickness.

190

4.4 Controlling project overruns

The institution has to normally depend upon the information monitoring system to find out the quantum of overrun and its reasons. It is also a common practice with the institutions to carry out some kind of re-evaluation of the project through visits and personal discussions to assess the impact of the overrun on the long term project viability and to determine the quantum of additional assistance needed to implement the project. Efforts are also made to motivate the promoters to bring additional funds to meet a part of the overrun.

In view of the generally complex nature of the project overrun which may be due to a combination of controllable and uncontrollable factors, it is not possible to prescribe effective remedies to avoid its occurrence in absolute terms. However, certain institutional safeguards may prove useful in limiting its magnitude. These are:

a) Proper project appraisal covering managerial, financial, economic, technical and market aspects

b) Effective co-ordination between project and follow-up wings of the institution so that persons entrusted with responsibility of looking after the project at design and implementation stage get fully conversant with the project concept, strong as well as weak points of the management, critical areas in implementation etc.

c) Introduction of a well designed information system fairly early in the project implementation stage.

d) Appointment of a nominee director immediately after sanction of assistance and the association of the nominee director in all important matters such as finalization of contracts, purchase, appointment of key personnel etc.

e) Use of project scheduling techniques like PERT/CPM and their constant updating.

f) Closer coordination between term lending institutions and the commercial banks on the one hand and financing institutions themselves where more than one institution is involved in project financing on the other

g) Closer co-ordination of the financing institution with the local authorities for timely allotment of land/shed, sanction of electricity connection,

approval of buildings plans, and the provision of necessary infrastructural support.

Streaming of operations of financial institutions so that the time taken is sanction of assistance and disbursement is kept to the minimum. The institution would also be well-advised to decentralize its operations and to have a second look at some of the stipulations which the promoters find difficult to comply.

5. PERFORMANCE REPORT

Performance report is a formal and systematic examination of the performance of an ongoing project comparing the work-turn out and the requirements. It involves measurement against pre-defined and relevant standards. It also constitutes an independent and authentic source of information.

The objectives of performance reports can be viewed in terms of the help it renders to the enterprise management in:

- Creating awareness among the project staff of the types and magnitude of the problems that are likely to encounter in completing the project and producing quality products, in planned volume and at competitive costs.
- Providing a clear picture, from time to time, of the actual status of the project.
- Prompt identification of the factors that might cause product quality problems or lead to time and/or cost overruns.
- Timely spotting of a variety of generic problems that are associated with execution of projects.
- Enabling the creation of a good information base for a proper estimation and costing of the project.
- Assisting in the establishment of appropriate standards and systems and recommending suitable work techniques.
- Identifying the specific training needs with reference to the project tasks; and
- Formalizing the experience and expertise in project management in order to be able to provide consultancy services to other enterprises.

The project officer has to investigate the underlying records, ascertain the tangible results of work done, look at the process and caliber of project management, examine the project methodology and techniques and get a clear picture of the project organization and controls. Having gone through the above aspects, he has to express his comments deliberately one the following lines:

1) Comment on current status
2) Forecast the future status
3) Highlight critical management issues
4) Point out exposure to risk and potential losses.

The project performance report on current status covers aspects of project cost performance, project's performance in relation to schedule, project progress performance, quality performance, compliance with work commitments and compliance with management's expectations.

Statement on progress performance compares the work done with related costs and highlights deviations from the financial assumptions made at the time of planning the project. A separate report focuses on the quality of performance of the project to enable revisions or modifications of methods of work or control mechanisms.

In the light of the progress to date, the forecast of the project status for future time periods or milestone has to be made and compared with contract or work commitments and management expectations. These reflect the project performance's considered conclusions assuming the observed trends persist, except to the extent that some observable trends of improvements are reckoned.

Aspects of particular significance that require management attention should be identified and reported. Observed and existing weaknesses or deficiencies that are bound to undermine the progress and outcome of the project, unless prompt and effective managerial actions are taken, come for special mention.

Some of the possible occurrence or events, that have some probability of occurrence, have to be interpreted in terms of adverse effects on the contractor or customers or other interested parties. The management can then consider possible actions to protect the interest of those likely to be affected. Mounting project costs may lead to pricing decisions that will impair the financial results of the clients.

6. ABANDONMENT ANALYSIS

Ordinarily a project is analyzed on the assumption that the firm will operate it for a given period. Often however, it may be possible to abandon the project before this period. This possibility of abandonment, when considered explicitly in project analysis, may change the decision itself.

Should a running project be abandoned now? If the sum of present values of cash flow up to abandonment, inclusive of realized abandonment value is greater than that the cash flows if the project is steered through its end, abandon it. The former value is called abandonment value and the latter continuance value. The abandonment value varies with time of abandonment, while continuance value remains same. At any point when the abandonment value is the greatest and more than the continuance value, that time if abandonment is struck, there may be maximum net gain to the project firm.

6.1 Abandonment in the normal course by will

Abandonment at will is resorted as a normal course, as that is economically found to be the better option. When the firm abandons, somebody takes and pays a price which is a cash flow that is added to the operating cash flow realized from the project.

An illustration will make things clear. A firm has estimated the expected cash flows in the normal course and amount realizable if the project is abandoned as follows:

Year	0	1	2	3
Expected normal cash flow	(1000,000)	400,000	450,000	400,000
Amount realizable if abandoned	1000,000	700,000	430,000	---

We have to compute the NPV of the project when abandoned at different points of time. Let the discount rate be 10%.

NPV of the project = -1000,000 – [4000,000 x 0.909 + 450,000 x 0.826 + 400,000 x 0.751] = 1000,000 – 1035,700= Rs. 35,700.

The abandonment value at time 0, 1 and 2 are computed below, assuming abandonment at that point of time:

194

If the project is abandoned at time zero itself , NPV = -1000, 000 + 1000,000 = 0

If the project is abandoned at time 1 (that is at 1st year end) itself , NPV:

= -1000, 000 + [400,000 x 0.909 + 700,000 x 0.909]

= -1000,000 – 999,000 = Rs. 1,000

If the project is abandoned at time 2 (that is at 2nd year end) itself , NPV:

= -1000, 000 + [400,000 x 0.909 + 450,000 x 0.826 + 430,000 x 0.826]

= -1000,000 – 1090,480 = Rs. 90,480.

Here the NPV is highest when the project is abandoned at the end of year 2. So, instead of continuing through the project till the 3 year is over, it could be abandoned at the end of year 2 itself.

There can be no abandonment at the end of the 3rd year, as the project is over by that time.

6.2 Abandonment due to legal compulsion

A hypothetical case is presented below. A firm fears confiscation or expropriation of its project by legal authorities one year from now. This may a real threat or mere guess. So the firm wants to decide to abandonment or continuing.

The cash flow right now obtainable by abandoning is S256 mn whether expropriation happens or not. If waited for a year, the estimated cash flow if expropriation happens is $ 200mn and when expropriation does not happen it is $ 600.

The fear of losing $56 mn ($ 256 mn - $ 200 mn) due to expropriation and the carrot of getting extra cash flow $ 344 mn ($ 600 mn- $ 256 mn) when the feared expropriation does not happen puts the firm in a dilemma.

What is the chance that the feared action will take place is the deciding factor here of the course of action to be followed by the project firm. But that is not explicitly available. So, given the discounting rate, we can estimate the value of minimum probability for expropriation that would trigger abandonment right now. To solve the issue, you need to estimate the probability of expropriation happening. Let it be ‘p’. Then known our cost of capital, we can estimate the minimum value of ‘p’ for a pull-out right now. Let cost of capital or minimum

required return be 22%. Then present value of cash flow under wait and see course becomes: [{$200p + 600(1-p)} / 1.22] mn.

The table given below summarizes the case well:

Alternative Courses	*Expropriation*	*No Expropriation*	*Expected Present Value*
Exit now (CF $)	256 mn	256 mn	$256mn
Wait a year (CF $)	200 mn	$600 mn	{$200p+600(1-p)} / 1.22 mn

CF : Cash Flow

By setting the expected cash flows under exit right now and wait a year courses equal, the minimum value of 'p' can be found.

Solve for 'p' in: $256mn =[{$200p + 600(1-p)} / 1.22] mn .

$256mn x 1.22 = $200p + $600 – $600p

$312.32mn = $600mn – $400p. mn

$400p mn= $ 271.68 mn or p= 0.7

From the above, if the chance for expropriation is 70%, it is immaterial whether you pull out right now or later. If the probability is more than 70% pulling out right now is a better course. If it is less than 70% there is no need to exit right now. So, the problem now becomes the estimation of probability of the expropriation happening!

6.3 Abandonment due to expected loss

If there is no worth of continuing because of imminent loss due to change of policy environment, technology environment, loss due to natural calamities and so on, then also a project may be abandoned. Here is no choice, but to abandon. Perhaps doing it quicker will save some penny for the concern.

Questions:

1. Discuss the importance of time and cost control system in a project.
2. How cost control can be done at different stages?

196

3. What do you mean by value engineering? And how it will be helpful to exercise cost control.
4. How PERT helps in scheduling? What is early start schedule and late start schedule?
5. Explain the significance of resource leveling and smoothening with the help of PERT
6. How the time monitoring can be done effectively?
7. How would you calculate the variability of product duration? How this helps in time monitoring?
8. Illustrate how scheduling can be matched with the availability of manpower.
9. What is crash timing a project? How is this done?
10. Explain the concept and use of CPM. How does it differ from PERT?
11. What is project overrun? Explain its causes and consequences.
12. Describe the nature and causes of cost and time over runs.
13. How does the cost and time overrun be controlled?
14. Explain the causes for overrun at the different stages of project life cycle.
15. What is performance reporting? Explain its structure and contents.
16. Discuss the concept of abandonment. How is it decided upon?

* * *

UNIT – 6

SPECIFIC PROJECTS: ISSUES & FEATURES

Syllabus covered: Issues relating to nature specific of Projects – Agricultural Projects, Industrial Projects, Infrastructural Projects – Public and Private sector Projects and Disaster Projects.

OBJECTIVES

1. To discuss the specific features of different projects by sector classification
2. To elaborate the nature and types of agriculture projects
3. To present the nature and features of industrial projects
4. To discuss the features and types of infrastructure projects
5. To deal with the nature and significance of public sector projects
6. To elucidate the nature and relevance of private sector projects
7. To analyze the nature and types of disaster handling projects

1. AGRICULTURAL DEVELOPMENT PROJECTS

Agriculture world over is accounting for 10% of global output. The field of fields has seen several technological inputs. Irrigation method and patterns have changed. Seed production method has changed. Harvesting has changed. Manure types have changed. Processing types have hanged. All these have been possible because of new developmental projects taken up from time to time. These agriculture projects are too many to provide an exhaustive list.

1.1 Features of Agriculture projects:

The special features of agriculture projects are described below:

i) There are a variety of projects, each one is unique.
ii) Projects range from mega ones like Irrigation Dams to small ones like sprinkler Irrigation.
iii) Project calls collaboration between Government, Self-Help-Group, Farmer or Farmer Organization and Financing body.

iv) Projects invariably have a subsidy component provided by the government with or without sharing of burden by funding agencies

v) Agriculture projects have tremendous environmental implications and that careful environmental assessment must be made

vi) By and large the projects have less market risk, but natural calamities are many.

vii) The project sponsor and the beneficiary are the same, usually the government is the sponsor and cultivators are the beneficiaries.

viii) The economic return may weigh less than the social return and that is the reason government is subsidizing the projects.

ix) Multilateral financial institutions are invariably involved in financing the projects.

x) The beneficiary's contribution may be too small or even nil depending on the social-economic stratum of the beneficiary.

xi) The tools of net-work may not be called for, for most projects

xii) SCBA is more relevant than ROI analysis.

1.2 Types of Agriculture Projects

National Bank for Agriculture and Rural Development (NABARD) projects: National Bank for Agriculture and Rural Development (NABARD the apex bank for agri-rural development in India has identified 15 major project areas for assistance by it. The schemes are: i. Minor Irrigation, ii. Land Development, iii. Farm Mechanization, iv. Plantation crops development, v. Horticulture development, vi. Dairy farming, vii. Poultry farming, viii. Sheep/Goat/Piggery rearing, ix. Fishery projects, x. Storage and Market yards, xi. Forestry, xii. Water shed development, xiii. Integrated Rural Development, xiv. Non-farm activities and xv. Bio-gas plant. Besides there are projects for Seed Development, Sericulture, Dry land farming, Self Help groups, SC/ST Action Plans and so on.

World Bank Assisted Projects: World Bank is financing Agricultural Development Projects (ADPs) in the states of Bihar, Rajasthan, Tamil Nadu, Andhra Pradesh, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Uttar

Pradesh and Assam to enhance the long-term sustainability in agricultural development and to create necessary infrastructure in the rural areas.

European Economic Community-Assisted Projects: European Economic Community (EEC)-assisted Integrated Watershed Management Project, namely, Doon Valley Integrated Watershed Management Project was developed in Uttar Pradesh in the 1990s. The major components are social forestry, livestock, horticulture, minor irrigation, agriculture, soil conservation, energy conservation, community participation, management land administration.

Crop Production Projects: For sustainable agriculture and increasing overall production of cereals, States and Union Territories are assisted through Centrally-sponsored schemes on (i) Integrated Cereals Development Program in Wheat-based Cropping Systems Areas (ICDP-Wheat); (ii) Integrated Cereals Development Program in Rice-based Cropping Coarse Cereals based on Cropping Systems Areas (ICDP-coarse cereals). In addition, in order to popularize new varieties, Seed Mini-kits Program for Paddy, Wheat and Coarse Cereals is also being implemented. Similarly, for the development of commercial crops, centrally sponsored like, Intensive Cotton Development Program (ICDP), Sustainable Development of Sugarcane-based Cropping systems and Special Jute Development Program are implemented.

Diary Development Projects: The significant role played by cooperatives in stimulating dairying has proved to be an important source of progress of the rural economy. The Operation Flood Program, which was the world's largest integrated dairy development program, has made considerable progress in achieving its outlined objectives The program has since completed its III Phase in April 1996. Now private sector participation in dairy farming enormous and that milk is available in plenty any time, any where.

Fisheries Projects: Fisheries play an important role in the economy of India. It helps in augmenting food supply, generating employment, raising nutritional level and earning foreign exchange. The Department of Agriculture and Cooperation has been undertaking directly and through State governments / Union Territories various production, input supply and infrastructure development programmes and welfare-oriented schemes besides formulating/initiating appropriate policies to increase production and productivity in the fisheries sector.

250

Water Resources Projects: Water is vital for realizing the full potential of the agriculture sector and the country's development. Optimum development and efficient utilization of our water resources, therefore, assumes great significance. The Ministry of Water Resources lays down policies and programmes for development and regulation of the country's water resources. It covers sectoral planning, coordination, policy guidelines, technical examination and techno-economic appraisal of projects, providing Central assistance to specific projects, facilitation of external assistance and assistance in resolution of inter-state water disputes, policy formulation, planning and guidance in respect of minor irrigation, command area development and development of ground water resources, etc. Expansion of irrigation facilities along with consolidation of the existing systems has been the main strategy for increasing production of food-grains. Irrigation support is provided through major, medium and minor irrigation projects and command area development.

National Watershed Development Project for rained areas: National Watershed Development Project for Rainfed Areas (NWDPRA was launched in 1990-91 and covers 25 states and two union territories. The objective of the project is restoration of ecological balance in rainfed areas and sustainable bio-mass production. It focuses on; (i) Conservation, up gradation and utilization of natural endowments in integral manner with low cost replica technology and (ii) generating employment opportunities for the poverty stricken rural masses in the rainfed areas through directly involving the fanners and watershed beneficiaries in planning and execution of all project works in the watershed by developing Self-Help-Groups of Mitra Krishak Manuals. Under this project the target is of treating an area of 28 lakh hectares at a cost of Rs. 1,100 crore.

World Bank assisted watershed development projects: The Integrated Watershed Development Project (Hills) has been in operation from 1991-92 in the states of Haryana, Himachal Pradesh, Jammu and Kashmir and Punjab. The main objectives of the project are to slow down and reverse degradation of natural environment through use of appropriate soil and moisture conservation technology and improve production potential of the areas.

Integrated Watershed Development Projects (Plains): Integrated Watershed Development Projects (Plains) has been taken up in the States of Gujarat, Orissa and Rajasthan. The main objectives of these projects are to slow down and

201

reverse ecological degradation in a variety of agro-ecological zones by promoting sustainable and replicable production system.

2. INDUSTRIAL PROJECTS

The most important characteristic of India's investment pattern has been very high priority to the capital goods industries. The overall thrust of the investment pattern all these years since the middle of fifties is the large provision for industrial development. Industrial projects are dominant ones.

2.1. Types of Industrial Projects

Industrial projects could be for starting new industrial unit, expansion of an existing unit, diversification of existing unit, rehabilitation of a sick unit, modernization of an existing unit, overseas acquisition, merger, reverse merger, buyout, leveraged buyout and so on.

New project may be a new product line, new market, green field project and so on. It could be R& D oriented, or production oriented or fabrication oriented and so on. Expansion may be scale expansion or scope expansion or spatial expansion. Diversification may be related or un-related, backward or forward or side-ward integration. Rehabilitation may be rehabilitation of own sick unit or acquired sick unit. Modernization may be modernization of own or acquired project. All these can happen within the domestic frame or on global scale. Now Indian companies are known for global acquisition of bigger companies relative to their own size. All these projects need planning, execution and control.

2.2 Nature of Industrial projects

Industrial projects involve i. Longer gestation period, ii. Huge capital outlay, iii. Technological considerations needing technological forecasting, iv. Environmental issues too, which require the extension of the scope of evaluation to go beyond economic costs and benefits, v. Irreversible decision once get committed, vi. Considerable peep into the future which is normally very difficult, vii. Measuring of and dealing with project risks which are a daunting task in deed and so on. All these make project management an important and critical task.

202

Projects may be divisible or indivisible. Usually, the indivisibility of project poses the problem of capital rationing because required funds and available funds may not be the same. A slightly high return projects involving higher outlay may have to be skipped to choose one with slightly lower return but requiring less outlay. This type of trade-off has to be skillfully made.

2.3 Internal and External Constraints

Industrial projects face different constraints, internal & external.

i. Internal Constraints

Internal Constraints refer to the limitations the firm is currently facing in taking up a project.

Employees may resent a new project addition as this may lead to some changes in their work, position, benefits, etc. In a highly unionized plant, introducing new projects is a difficult task.

Capital Availability is another internal constraint, assuming that the firm is not using external capital market in the time being.

Management Personnel, may, sometimes, have vested interests in blocking new projects. Perhaps, occasionally, for cannibalistic effects, management may reject a new project.

Locational disadvantages may make a project unattractive for a particular firm. Space and building constraints may also stand in the way.

Authority-Responsibility structure is an organization might be a constraint in taking up a new project. While senior may not have time to assume additional responsibility, he is not interested in giving the project to his junior for fear of the latter becoming popular along with the project.

ii. External Constraints

External constraints arise due to (i) project dependence, (ii) capital rationing and (iii) project indivisibility.

Dependence of Projects: There are projects which are though not mutually exclusive, i.e., the selection one does not affect the selection or otherwise of the other, when taken together, one is eating into the revenues of the other. A toll bridge and toll ferry service over a perennial river are a case in point. Both can

203

be simultaneously taken up. But, only either one or the other will emerge profitable. So, the choice of project is externally affected.

Capital Rationing: Capital Rationing as a constraint affects the firm when it cannot raise resources at the planned cost of capital either due to sudden changes in capital market conditions or due to increased risk perception of the investors about the project.

Project Indivisibility: Project Indivisibility is an important constraint. Small businesses are affected by this factor. There is no partial taking up of the project. Full scale implementation might put strains on the firm's budget, cost of capital etc.

Taking into account both the internal and external constraints project solution is made.

2.4. Industrial Project Lending

IDBI Schemes: Industrial Project Lending is very much developed in the country. The development financial institutions and commercial banks have great schemes for lending for projects. Micro Credit Scheme, Pollution control Finance Scheme, Technology Up gradation Scheme, Venture Capital Scheme, Equipment Conservation Scheme, Technical Development Fund Scheme, Equipment Finance Scheme, Leasing, Direct Discounting Scheme, Asset Credit Scheme; and Foreign Currency Assistance Scheme, Refinance Scheme for Industrial loans to medium industries, Bills Rediscounting Scheme, Seed Capital Scheme, Refinance Schemes for Modernization and Rehabilitation of Medium Industries, Equipment Refinance Scheme, Scheme for concessional assistance for manufacture & installation of Renewable Energy System, Scheme for investment in shares and bonds of other financial institution are operated by Industrial Development Bank of India.

IFCI Schemes: Scheme of Finance for Renewable Energy System, Scheme of Financing the Development of Industrial Estates, Scheme of Financing Power Projects, Equipment Finance Scheme, Equipment Finance for Energy Conservation Scheme, Equipment Procurement Scheme, Equipment Credit Scheme, Suppliers' Credit Scheme, Scheme for Financing Leasing & Hire Purchase Concerns, Scheme of Equipment Leasing, Scheme of Financing Corporate Hospitals & Multi Disciplinary Health Centre, Financing of Renewable Energy System Over Run Financing, Assistance for Development of

2004

Technology through in house R&D efforts, Risk Capital Assistance Scheme, Consultancy Fee Subsidy Scheme, Interest Subsidy Scheme and Entrepreneurship Development Scheme are operated by the Industrial Finance Corporation of India.

IFCI Advisory cell for NRI Entrepreneurs has opened a cell for providing counseling and advisory services to the Non-resident Indian (NRI) entrepreneurs in setting up new Industrial Projects in the country. The cell would assist such prospective entrepreneurs to assess the techno-economic viability of their proposed projects and counsel them on suitable finance-mix and tying-up of finance from appropriate, agencies, viz. financial institutions. banks. mutual funds, venture capital funds as well as from the capital market.

2.5. Government Participation in Industrial Projects

One of the most fundamental and far-reaching decisions that a developing economy takes is whether the government should sponsor, build, own, and operate new industrial projects as a matter of policy, or assign these functions to private entrepreneurs. Government projects and private projects operate in vastly different environments, associated with different advantages and disadvantages.

That is why the decision regarding the choice of approach is very crucial. To a large extent, this decision depends on 'the constitution' of an economy both political and economic. In a country like India, public and private sectors coexist to undertake major and minor projects. In this connection we can further bifurcate the developmental projects into location-wise and resource-wise spread projects.

Under the location-wise or area-wise development projects, urban and rural developmental projects undertaken by government are covered. Under the umbrella of urban development projects, infrastructural development projects, public service projects (sewage, municipal water, public utilities, roads, and flyovers), road and transport development projects etc., are undertaken by me State or Centre Governments. In the rural development projects, the focus is on facilitating the agro-based projects such as irrigation canals, and other agro based activities such as Poultry farming, Dairy Farming and Cattle rearing, Food processing etc.

205

Sometimes, developmental projects are undertaken either by the State or the Centre or the local authority especially to improve the 'resources' of that area and to reduce the regional imbalances of an economy.

3. INFRASTRUCTURAL PROJECTS

Infrastructure, covers the services of transportation (railways, roads, ports, civil aviation); electricity transmission and distribution; communications (telecommunication and post and telegraph, e-mail, internet, etc); water supply and sanitation, and solid waste management, is one of the most important necessities for unleashing high and sustained growth and alleviating poverty, particularly in the backward States.

From a policy perspective, there is now a widespread consensus that direct government production of all infrastructure projects introduces difficulties concerning technical efficiency, adequate scale of investment, proper enforcement of user charges, and competitive market structure. At the same time, a pure reliance on private production in an unregulated market is not likely to produce sound outcomes. India has been actively engaged in finding the appropriate policy framework, which gives the private sector adequate confidence and incentives to invest on a massive scale, but simultaneously preserves adequate checks and balances through transparency, competition and regulation.

A significant factor than can fuel the growth of the infrastructure projects is the planned investment of around $ 200 billion by the Indian government from 2004 to 2010.

3.1 Immense Growth Recorded

The infrastructure sector experienced mixed outcomes in recent years with medium – high growth. The growth rate in many key sectors accelerated. Strong growth rates have been noticed for electricity generation, railways, ports and civil aviation.

The overall power generation of 700 Billion Units (BU) in 2006 is a great achievement. Hydel power generation continued to enjoy high growth in the current year. Thermal and nuclear power generation also grew.

206

The revenue earning freight traffic of 600 million tonnes carried by the railways in 2006 is no mean achievement. Cargo handled at major ports also rose quickly in recent years to touch 380 million tonnes in 2006.

In the civil aviation sector, strong positive growth rates were experienced in passenger traffic recording over 25% growth year on year in recent 3 years as well as export and import cargo handled at the international and domestic terminals is touching an annual growth of 20%.

The telecom sector witnessed a sharp decline in tariff particularly in the Mobile, National Long Distance and International Long Distance segments, which had triggered a galloping growth in the sector. Landline subscribers in 1995 were12 million and in 2006 it rose to 50 mn. Mobile subscribers in 1995 were 0.03 million and in 2006 it rose to 160 mn. Internet subscribers in 1997 were 25000 and in 2006 it rose to 9 mn. Internet users in 1998 were 1.4 million and in 2006 it rose to 40 mn. The telecom sector is achieving a tele-density of 15 by the year 2006.

3.2 Lucrative Project Opportunities in Infrastructure Sector

The Indian economy is becoming a service oriented economy with 60% GDP coming from the services sector, as is the case with developed economies. And this gives great scope for many project opportunities. The private sector has benefited from the privatization policy followed by the government. The Aviation sector is doing neatly with lot many private carriers having a field day. Railways is also fast catching up with selective privatization and mega projects getting executed, particularly due to gauge conversion and electrification of routes. The road sector is adding enormous capacity by 4 laning, 8 laning of national highways, Golden Quadrilateral, North-South and East-West Corridors and so on. The port sector is doing well with expansion and modernization. The Sethu Samuthram project is going on stream well involving linking our east and west coast ports via Palk strait. The Government and Private investment in all these infrastructural projects, including petro-products, is rising rapidly. The gross capital formation in the infrastructural sector has crossed Rs 1.5 trillion with annual rise of 10% or so. And there lies the project opportunities.

3.3 Effective enforcement of Electricity tariff Policy for Power Projects in India (2004 -09)

Central Electricity Regulatory Commission (CERC) has emphasized that all future projects and new investment in generation, transmission and distribution, both by public sector utilities as well as independent power producers(IPPs) should be structured through a tariff based transparent competitive bidding process. This would be an improvement over the existing framework of detailed regulation based on a 'cost plus' approach, which leads to inefficiencies and lack of incentive for cost minimization. During the period of transition to a competitive bidding regime, CERC proposes that tariff regulation should move away from the cost plus actual approach, to style of light handed regulation based on normative parameters. This would incentivise efficiency and streamline tariffs. These parameters include: In the new terms and conditions for regulating the tariff of projects set up on cost plus basis, CERC will adopt a normative debt equity ratio of 70:30 for all generation and transmission projects. The return on equity shall be 14 per cent post tax, uniformly applicable to CPSUs and IPPs. Advance against depreciation shall be allowed to meet debt service obligations by considering the repayment period of loan as 10 years. The development surcharge has been discontinued. The performance benchmarks of plant availability for hydro and thermal generating stations have been raised. Efficiency benchmarks for coal, lignite and gas based thermal generating stations have been raised. The norms for specific oil fuel consumption and auxiliary energy consumption within the power stations have been tightened. Normative benchmarks have been set for operation and maintenance expense payable to thermal generating stations and transmission licensees. The frequency linked unscheduled interchange (UI) rates for deviation from the generating or energy drawal schedules have been revised upward.

3.4 Infrastructure Equipment Industry – Great Projects to come

The ever growing need for enhanced infrastructure in a developing economy like India and the significance attached by the government to meet the rising public expectation in this regard is all set to translate into big business for the Infrastructure Equipment (IE) Industry.

Many project opportunities

Though at present confined to the organized sector and large companies, the industry offers tremendous business and growth opportunities for small and

medium enterprises, particularly those operating in the engineering field, and suppliers and outsourcing sub contractors. It is in this backdrop and given the country's potential to emerge as the construction equipment hub, component outsourcing base, and a design base for equipment and components industry, a study on the industry was recently commissioned by the confederation of Indian Industry. The projected the size of the Indian IE Industry to be between US $ 3.5 and 4.2 billion by the end of this decade, a two fold growth from the present turnover of almost $ 2 billion. The industry over the last five decades has evolved and grown to a stage where it spans all major equipment categories such as earthmovers, those used in road construction, building industry and material handling, material preparation equipment and tunneling and drilling equipment.

The market comprises primarily of product sale from organized sector. It also includes other segments such as spare parts, sale to unorganized sector, import and sale of used IE equipment and services and exports. The demand for IE is around $20bn in the next 5 years ending 2010.

Enhanced service levels

One of the major is the growing emphasis laid by the users of the infrastructure equipment on high quality of service from the equipment manufacturers. "While product quality and performance continues to be important, service quality is emerging as a key differentiator". The customer expectations reflected the need for a variety of services across the equipment usage cycle. This provides opportunities for equipment manufactures to generate additional revenues streams by providing end to end services. Such initiatives would require the IE manufacturers to collaborate with other industry stakeholders, and could yield benefits in the form of increased customer loyalty, increased revenues from new services and opportunities to cross sell equipment. The role and significance of technology can not be under-estimated. "Technology will have on increasing impact on equipment performance, features and usage, as well as equipment monitoring and project execution. Some areas were technology is expected to have a significant impact include remote equipment diagnostics, telematics, equipment safety operability, performance optimization and equipment versatility". This could mean new business opportunities for small and medium enterprises in the areas.

For the IE industry to grow, the Government needs to place continued thrust on infrastructure growth through public – private partnership, launching a

system of compulsory licensing of the IE operators, and streamlining of the tax and legal issues and on the importance of trained manpower availability by collaboration between the government, industry and academic institution concerned.

Challenges and opportunities

The challenges the IE industry faces are, low investment in research and development, lack of strong vendor base, absence of an organized market for used equipment, and inadequate infrastructure to support growth. But these challenges could well mean opportunities, especially the lack of a strong vendor base. A strong component industry is a prerequisite for not only growth in the domestic market, but also exports of IE. Like the well-established and high quality auto components industry that played a large role in India's emergence as a key global market and sourcing hub in the automotive industry, IE industry must turn every hurdle into a handy opportunity.

4. PUBLIC SECTOR PROJECTS

Any project whose objectives are of overall economic growth obviously falls under the purview of public sector project. Construction of a river valley, Regulating water supply for irrigation purpose through dams and basins, Construction and Maintenance of National Highways, generation and distribution of Electricity, establishing new and cheaper means of transport systems, etc. In fact, public sector projects are all-pervasive and accommodate every need of the civic life of the people in a country. Public sector projects can be defined as "Projects or Programmes executed under the government regulations, management and control directly by the Centre of State or through its active participation in allocating funds from the public budget (revenue) to invest in them.

Most of these projects are undertaken by the corporations of the public sector such as NTPC, STC, NTC, HZC, FCI, SAIL, IAAI, BHEL, DNH, and other departmental undertakings such as Railways, Telecommunication, Posts & Telegraph, etc. The basic and heavy industries such as Ordinance factories, Oil and Natural gas exploration. Railway projects, Aeronautics units, other defense projects, Dams, canals, bridges, were set up by public sector only until recently

Many public sector projects are also under direct ownership of central government.

Social Projects: Social Projects such as Hospitals, Schools/ Universities/ Institutes, Clubs, Library, Zoo are worked out on the basis of the justification of social costs and benefits analysis. These projects are promoted mostly by public sector

The public sector projects were started for self-sufficiency in the basic needs of the national economy. Since these projects required heavy financial investments, which would not have been possible by the private entrepreneurs, the government had to set up these enterprises. The criterion for the investment decision in all such projects was based on national economic requirements. Hence, no financial profitability indices were followed.

Objectives of public sector projects:

The fundamental objectives of public sector projects originate from the burgeoning needs and expectations of a society. Public sector projects are often initiated by government and the required budgets are accordingly allocated towards execution of such projects from government revenue. Public sector projects are considered too be 'engines of growth and glued to economic development'.

The following are the essential objectives:

- to help the rapid economic growth and industrialization of the country and create necessary infrastructure to smoothen the process of growth and development
- to earn a fair rate of return on investment and thus generate resources for development
- to promote redistribution of income and wealth
- to create employment opportunities
- to promote balanced regional development
- to assist the development of small scale and ancillary industries
- to promote import substitution, save and earn foreign exchange for the economy

Characteristics of public sector projects

The prominent features of public sector projects are given below:

- Usually owned either purely by government or a government supported consortium of private sector companies, hence the project has more chance of being vetoed or delayed by one of the parties;
- Having a significant impact on me economy and environment, with a considerable government involvement;
- They are relatively few successful ones on the corporate catalogue due to insufficient people with adequate experience from either government or the private sector;
- Resources are generally indivisible integrated often that cannot help projects to built in parts; and
- They hinge on prolonged investigations, approval and construction periods;
- They confront with difficulties of accessibility, climate, terrain and large workhorses, particularly on national and overseas projects;
- They regulate and impact markets by putting major strains of tariffs and conditions on the contractors and suppliers;
- They are the roots of major environmental and socio-economic impacts by generating public impatience on long-term projects;
- They impose large and special risks on parties involved, particularly those vulnerable to economic recession and me fallibility of long term economic forecasting;
- Usually it is difficult to finance such projects where sponsors need to convince financiers that the project will indeed be completed as scheduled and be able to generate funds to repay debts.

Benchmarking contributions of public sector projects:

The precise benchmarking contributions of public sector projects are presented below.

- Effectively allocate the available scarce resources amongst the genuinely needed areas of growth and help the economy become self-reliant;

- ➢ Regulate and control market mechanism and take economic decisions rationally;
- ➢ Provide basic infrastructure in an underdeveloped economy and see that transformation process is smoothened towards growth;
- ➢ Provide minimum basic amenities that are essential for public life and justify the budgets allocated during such period;
- ➢ Create and increase national wealth which spin-offs the public revenue in the form of taxes and dues and create spiraling effect on the investment;
- ➢ Provide benchmarks of performance to the private sector and restrict or regulate their unfair means of project development;
- ➢ Cuts across irregularities in trade practices and renders services to the public;
- ➢ Restrict irregular or illegal inflow or outflow of foreign exchange that may affect local currency and stimulates inflationary pressures;
- ➢ Maintain equilibrium between various types and sizes of industries through extending timely consultations;
- ➢ Clearly the game plan is played in an atmosphere of political intrigue in which the politicians and bureaucrats are deeply involved in wheeling and dealing to protect the interests of economy and society and help advance the country beyond one's expectations.

Most common reasons for failures: Some of the most common reasons for failures on the part of public sector projects may be attributed to the following:

- Centralized and delayed decision-making with least considerations to emergencies;
- Lack of managerial autonomy and accountability;
- Weak financial discipline leading to financial crisis;
- Poor investment choice, low productivity, excessive leverage;
- Colossal losses justified with social objectives;
- Too many directions and controls leading to chaos and confusion;
- Rigid bureaucratic control and inflexible plans.

To overcome the problem of failures in the public sector projects, we have to invite private investors for an effective participation in the project

development having due share of fruition. Since the private investors are 'yield-thirsty' it should be quenched by lucrative offers and allowing them to create a platform for the development

As a mixed financing scheme is becoming more or less inevitable for large infrastructure investments, it is important for both sectors to bring out their respective strengths. This often implies the use of a project finance approach, whether the sponsor is a public entity or a private company. On some large projects such as high speed rail projects, it can be a positive approach to separate the commercial operations from technical ones and also during the construction period from the operating one.

In that way, private and public sectors can share the responsibilities and the risks according to the parts of the project they best know and master. There is a wide range of possible legal and financial mixed schemes which can achieve the balance between the objectives and constrains of the public and private sector and remove the obstacles to carry out projects, even if financial rates of return are not sufficiently high to get the private sector interested. This very wide range of financing schemes have been especially developed during the last decade, These schemes can imply separately or together a sharing of the funding, a share- aiming of risks, a sharing of the management framework between the government of local authorities and the private sector. This can be achieved through different types of contractual arrangements,

5. PRIVATE SECTOR INVESTMENT

As the funds required to develop national infrastructure exceed available funds, governments, not just in India but around the world, are increasing the involvement of the private sector in the financing, designing and operation of major infrastructure projects. In addition to fiscal stringency, efficiency gains from private sector involvement in the design, construction and operation of infrastructure projects arc known to be the driving forces for the increased few of private capital to infrastructure projects. Private sector involvement in infrastructure projects is typically in the form of BOT projects. Derivatives of BOT include schemes such as BOLT (Build-Operate-Lease-Transfer), BOO, and RLT (Rehabilitate-Lease-Transfer) in the case of power projects,

Economic reforms in most countries have made privatization as one of the most important policy and operational measures. Privatization essentially means increasing the role for private initiative. State initiative resulted in growth of

public sector. But with time public sector became a white elephant. The reasons are not far to seek. First, the objectives of public sector are a mixture of conflicting orientations. So, objective performance measurement is not possible. So, performance is the casualty.

Increasingly, political dead weights are made the reigning heads of public sector units and under such leadership these units further drifted. Public sector management cadre under the guise of political intervention did not act professionally. Public sector employees lacked work culture, taking advantage of protective labour laws and not-so-committed or talented management. In sum, public sector became a drain on budgetary resources of government. For fear of political onslaught government after government, simply public sector allowed to continue as such. There is no point in blaming the founding fathers of public sector for the present lacunae of public sector which grossly reflect current political, managerial and work cultures. But at some point of time, due to external and internal public opinion, public sector's role need to be modified.

So privatization of existing public sector is pursued. Part ownership by private sector of existing public sector units is done, popularly known as voucher privatization. Private sector participation in infrastructure development is very much encouraged. Industries reserved for state sector are opened for private sector. Step by step competition is being introduced between public and private sector. With competition efficiency and development are achieved.

With economic activities have to be conceived, designed and executed with a global perspective, privatization has taken wings to become globalization. Globalization takes place through flow of capital, technology, people, market, management and goods across nations. Foreign technology flow is also increasingly happening through technical collaborations. Flow of goods is taken care of by open trade policy. Companies are becoming cross-border or borderless. That is through foreign subsidiaries and joint-ventures, companies have operations spread over several nation states. MNCs play a vital role in this regard.

6. DISASTER PROJECTS

Disasters befall unexpectedly and also expectedly. Better disaster management initiatives, systems and practices help reducing the impact of unavoidable ones and preventing the avoidable ones.

215

Disasters are unbearable problems caused by natural calamities like Tsunami, Earthquake, Nuclear blow-blast, Huge Flood, Hurricanes, a ravaging fire accident in an oil well, etc. with grave consequences giving a sudden jolt to the sustenance of people. Disasters rupture the functioning of the affected party for several weeks to years. When disasters occur in multiple, more often they tend to do so, the severity staggers steeply putting a huge stress on the physical, psychological and intellectual resources of the all concerned. Disasters could be man-made, system-made or environment-made. Disasters annihilate mostly and occasionally cripple. Disasters can cause extinction. Disasters are quite unexpected. We could be fore-warned given the technological developments. Enlightened disaster management team could visualize enormity of losses and havocs and can do damage control effectively.

6.1 Managing Crises

For the confident person, no disaster is threatening. Feeling diffident in the wake of disasters, shirking away responsibility for mitigating damages caused and keeping fingers crossed are worst of disasters. To become panic-stricken at disasters is no good.

The team dealing with disaster management project must quickly do all or more of these cited below.

i. Try Damage Control: First do damage control. Assurance of effective preventive causes and immediate alternative courses will do for confidence building. Any knee-jerk reactions like finding scapegoats, etc will only precipitate the disaster.

ii. Quickly Trouble Shoot: Sooner engage in to shoot the trouble out. An expert team is better put up with the work. Pace of shooting the trouble down is very important as this helps cure as well as prevention.

iii. Reach-out to the Affected: To the affected, inside or outside dispatch sooths, monetary or humane interim compensation. Again **speed of action** is most needed. Behave very much responsibly.

iv. Build Favorable Public Opinion: Build favorable public opinions to get public involvement. Let the media and affected have a first hand knowledge of the disaster so that they don't write and speak based on hearsay. Unearth the truth. Make it transparent.

v. Develop Preventive Alternatives: Now with the knowledge of the disasters, work out alternative courses of action to prevent recurrence of suffering even though disaster could strike again. Evolve foolproof courses of action. Ensure their feasibilities.

vi. Execute chosen Alternative: Now execute the chosen alternative to deal with the aftermath of the disaster.

vii. Normalize Operations: Once stability limps back, normalize operations and connect severed relationships. Do communicate with the stakeholders about the disaster and their management.

viii. Build Coalition: Disasters are to be handled in coalition. Be prepared to rope in committed partners to deal with the disasters in less time, with more vigor. Thus strengths are added, weaknesses are reduced, opportunities are multiplied and more importantly threats are denounced.

ix. Be Compassionate: The affected need more compassionate treatment and counseling than compensation, please note.

x. Document the episode: Though a bitter episode, do document the same, communicate with concerned stakeholders to make them to be always alert, informed of responsible behavior and be ready to make sacrifices at times of need in the larger interest.

6.2 Disaster Handling Projects

Disaster handling projects are of two types, namely, Immediate Relief Rendering Projects and Havoc Preventive Projects.

Immediate Relief Rendering Projects: Immediate Relief Rendering Projects press for timely relief to affected people as the sole criterion of performance. Cost is immaterial, because what is saved now (mostly human life, Human feeling) is more valuable than what is to be spent now in the process. Anything needed to gain time, is allowed in these projects. Prior sanctions are not awaited for actions. Rather quick actions are lauded. Round the clock work is done at the work site. P cost will go up very high but project time will get drastically reduced and that is the ultimate goal. Specialists involved. Better logistics management must be tried on a war-footing basis. When the Tsunami hit the southern coast of India in December 2004, the local and district administration did a yeomen relief-giving service to the affected.

Havoc Preventive Projects: Havoc Preventive Projects are projects for constructing fore-warning systems, havoc-proof work stations or dwelling places and so on. These projects are to be immediately undertaken, but with sound planning. SCBA is relevant here than just commercial profitability.

Questions:

1. Present the specific features of different projects by sector classification.
2. Elaborate the nature, relevance and types of agriculture projects.
3. Present the nature, types and features of industrial projects.
4. Discuss the features, scope and types of infrastructure projects.
5. Explain the features and significance of public sector projects.
6. Elucidate the nature and relevance of private sector projects.
7. Explain the concept and special features of disaster projects.

* * *

218

MODEL QUESTION PAPER

Paper 4.5: PROJECT PREPARATION

Time: 3 Hours . Maximum 100 Marks

PART-A (5x 8 = 40 marks)

Answer any **Five** questions

All questions carry equal marks

1. Explain the features and significance of public sector projects.
2. How PERT helps in scheduling? What is early start schedule and late start schedule?
3. What are the contents of a tender document?
4. Critical activities and time estimates of a project are as under.

Activity	T_p	T_m	T_o
A-B	10	9	2
B-H	9	4.5	3
H-I	5	3	1
I-L	5	3	1
L-M	5	1.5	1
M-N	5	1.5	1

Calculate std. deviation of project time.

5. Give an account of the role of different personnel involved in project administration.
6. Explain the UNIDO guidelines for SCB Analysis.
7. What is SWOT analysis? How is it relevant to project formulation?
8. Explain the significance and merits of BOOT and BOT projects.

PART-B (4x 15 = 60 marks)

Answer any **Four** questions

All questions carry equal marks

9. Discuss the features, scope and types of infrastructure projects.

10.. A firm has estimated the expected cash flows in the normal course and amount realizable if the project is abandoned as follows:

Year	*0*	*1*	*2*	*3*
Expected normal cash flow	(1000,000)	400,000	450,000	400,000
Amount realizable if abandoned	1000,000	700,000	430,000	---

We have to compute the NPV of the project when abandoned at different points of time. Let the discount rate be 10%.

11. Activities in the Project, Duration and Employees needed per day for each activity and total number of employees needed for completion for each activity:

Activity	Days Needed	Employees Needed Per day	Employees Needed Total	Activity	Days Needed	Employees Needed Per day	Employees Needed Total
A – B	8	3	24	H – I	3	3	9
B – C	2	5	10	E – I	3	3	9
B – D	1	2	2	G – J	2	4	8
C – E	1	3	3	J – K	1	3	3
B – F	3	7	21	I – L	1	3	3
D – G	1	2	2	K – L	1	3	3
F – G	1	2	2	L – M	1	2	2
B – H	6	5	30	M – N	1	2	2

Draw the net-work diagram for the above project.

12. Describe the prerequisites for successful project implementation?

13. What is a case analysis? How is it useful to project management? What are its limitations?

14. What is financial appraisal? Explain how risk and leverage analysis is done.

15. What do you mean by feasibility study? Explain its significance in project formulation?

ଔଷ

Educate → Empower → Elevate

Alagappa University formed in 1985 has emerged from the galaxy of institutions initially founded by the munificent and multifaceted personality, Dr.R.M. Alagappa Chettiar in his home town at Karaikudi. Groomed to prominence as yet another academic constellation in Tamil Nadu, it is located in a sprawling and ideally suited expanse of about 420 acres in Karaikudi.

Alagappa University was established in 1985 under an Act of the State Legislature. The University is recognised under Sec.2(f) and Sec.12(B) of the University Grants Commission. It is a member of the Association of Commonwealth Universities and the Association of Indian Universities. The University is Accredited with 'A+' Grade by NAAC.

The Directorate of Distance Education offers various innovative, job oriented and socially relevant academic programmes in the field of Arts, Science, IT, Education and Management at the graduate and post graduate levels. It has an excellent network of learning Centres for providing effective service to the student community.



ALAGAPPA UNIVERSITY

(Accredited with 'A+' Grade by NAAC)

Karaikudi - 630 003.

DIRECTORATE OF DISTANCE EDUCATION